TABLE 6-9
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
Jet Propulsion Laboratory -- Operable Unit-2

Scenario Timeframe:	Future
Medium:	Soil
Exposure Medium:	Soil
Exposure Point:	Discharge Point 4

CAS Number	Chemical	Minimum Concentration (1)	Minimum Qualifier	Maximum Concentration (1)	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (2)	Background Value (3)	Screening Toxicity Value (4)	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for Contaminant Deletion or Selection (5)
7440-38-2	Arsenic	2.2		4.7		mg/kg	Test Pit #1A	4/4	N/P	4.7	2.2	0.31	N/A	N/A	Yes	ASL
7440-47-3	Chromium (VI) (6)	0.07		0.13		mg/kg	Test Pit #1A	2/4	N/P	0.13	N/A	0.20	N/A	N/A	No	BKG

(1) Minimum/maximum detected concentration.
(2) Maximum concentration used as screening value
(3) Refer to Section 6.3.14 for a discussion of the comparison to background
(4) Screening toxicity value derived in accordance with State of California Department of Toxic Substances Control Preliminary Endang *Assessment Guidance Manual (DTSC 1994) and USEPA Risk Assessment Guidance for Superfund (USEPA 1989). See* Appendix I for methodology
(5) Rationale Codes Selection Reason: Above Screening Levels (ASL)
Deletion Reason: Background Levels (BKG)
(6) USEPA 1998b

Definitions: ARAR/TBC = Applicable or Relevant and Appropriate Requirement/To Be Considered
CAS = Chemical Abstract Service
COPC = Chemical of Potential Concern
mg/kg = milligrams per kilogram
N/A = Not applicable
N/P = Not provided by the laboratory performing the analyses

TABLE 6-10
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
Jet Propulsion Laboratory – Operable Unit-2

Scenario Timeframe:	Current
Medium:	Soil
Exposure Medium:	Soil
Exposure Point:	Waste Pit 1/ Discharge Point 1

CAS Number	Chemical	(1) Minimum Concentration	Minimum Qualifier	(1) Maximum Concentration	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	(2) Concentration Used for Screening	(3) Background Value	(4) Screening Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	(5) Rationale for Contaminant Deletion or Selection
11097-69-1	Arochlor-1254 (6)	0.018		0.2		mg/kg	Test Pit #2	2/2	N/P	0.2	N/A	0.11	N/A	N/A	Yes	ASL
11096-82-5	Arochlor-1260 (6)	0.021		0.27		mg/kg	Test Pit #2	2/2	N/P	0.27	N/A	0.11	N/A	N/A	Yes	ASL
7440-38-2	Arsenic	1.9		3.0		mg/kg	Test Pit #2A	5/5	N/P	3.0	2.2	0.31	N/A	N/A	Yes	ASL
7440-47-3	Chromium (VI)	0.12		0.84		mg/kg	Test Pit #2A	2/4	N/P	0.84	N/A	0.20	N/A	N/A	Yes	ASL

(1) Minimum/maximum detected concentration

(2) Maximum concentration used as screening value

(3) Refer to Section 6.3.14 for a discussion of the comparison to background

(4) Sreening toxicity value derived in accordance with State of California Department of Toxic Substances Control Preliminary Endangerm *Assessment Guidance Manual (DTSC 1994) and USEPA Risk Assessment Guidance for Superfund (USEPA 1989) See* Appendix I for methodology.

(5) Rationale Codes Selection Reason: Above Screening Levels (ASL)

(6) Screening toxicity value based on cancer potency of polychloronated biphenyls

Definitions: ARAR/TBC = Applicable or Relevant and Appropriate Requirement/To Be Considered
CAS = Chemical Abstract Service
COPC = Chemical of Potential Concern
mg/kg = milligrams per kilogram
N/A = Not applicable
N/P = Not provided by the laboratory performing the analyses

TABLE 6-11
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
Jet Propulsion Laboratory -- Operable Unit-2

Scenario Timeframe:	Future
Medium:	Soil
Exposure Medium:	Soil
Exposure Point:	Waste Pit 1/ Discharge Point 1

CAS Number	Chemical	Minimum Concentration (1)	Minimum Qualifier	Maximum Concentration (1)	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (2)	Background Value (3)	Screening Toxicity Value (4)	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for Contaminant Deletion or Selection (5)
11097-69-1	Arochlor-1254 (6)	0.018		0.2		mg/kg	Test Pit #2	2/2	N/P	0.2	N/A	0.11	N/A	N/A	Yes	ASL
11096-82-5	Arochlor-1260 (6)	0.021		0.27		mg/kg	Test Pit #2	2/2	N/P	0.27	N/A	0.11	N/A	N/A	Yes	ASL
7440-38-2	Arsenic	1.9		3.0		mg/kg	Test Pit #2A	5/5	N/P	3.0	2.2	0.31	N/A	N/A	Yes	BKG
7440-47-3	Chromium (VI)	0.12		0.84		mg/kg	Test Pit #2A	2/4	N/P	0.84	N/A	0.20	N/A	N/A	Yes	ASL

(1) Minimum/maximum detected concentration

(2) Maximum concentration used as screening value

(3) Refer to Section 6.3.14 for a discussion of the comparison to background

(4) Sreening toxicity value derived in accordance with State of California Department of Toxic Substances Control Preliminary Endangerment *Assessment Guidance Manual (DTSC 1994) and USEPA Risk Assessment Guidance for Superfund (USEPA 1989) See* Appendix I for methodology.

(5) Rationale Codes Selection Reason: Above Screening Levels (ASL)
Background levels

(6) Screening toxicity value based on cancer potency of polychloronated biphenyls

Definitions:
ARAR/TBC = Applicable or Relevant and Appropriate Requirement/To Be Considered
CAS = Chemical Abstract Service
COPC = Chemical of Potential Concern
mg/kg = milligrams per kilogram
N/A = Not applicable
N/P = Not provided by the laboratory performing the analyses

TABLE 6-12
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
Jet Propulsion Laboratory -- Operable Unit-2

Scenario Timeframe:	Current
Medium:	Soil
Exposure Medium:	Soil
Exposure Point:	Waste Pit 4

CAS Number	Chemical	(1) Minimum Concentration	Minimum Qualifier	(1) Maximum Concentration	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	(2) Concentration Used for Screening	(3) Background Value	(4) Screening Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	(5) Rationale for Contaminant Deletion or Selection
7440-38-2	Arsenic	2		5.6		mg/kg	B-30	3/3	N/P	5.6	2.8	0.31	N/A	N/A	Yes	ASL

(1) Minimum/maximum detected concentration

(2) Maximum concentration used as screening value

(3) Refer to Section 6.3.14 for a discussion of the comparison to background

(4) Sreening toxicity value derived in accordance with State of California Department of Toxic Substances Control Preliminary Endangerme *Assessment Guidance Manual (DTSC 1994) and USEPA Risk Assessment Guidance for Superfund (USEPA 1989) See* Appendix I for methodology.

(5) Rationale Codes Selection Reason:

Above Screening Levels (ASL)

Definitions:

ARAR/TBC = Applicable or Relevant and Appropriate Requirement/To Be Considered

CAS = Chemical Abstract Service

COPC = Chemical of Potential Concern

mg/kg = milligrams per kilogram

N/A = Not applicable

N/P = Not provided by the laboratory performing the analyses

TABLE 6-13
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
Jet Propulsion Laboratory -- Operable Unit-2

Scenario Timeframe:	Future
Medium:	Soil
Exposure Medium:	Soil
Exposure Point:	Waste Pit 4

CAS Number	Chemical	Minimum Concentration (1)	Minimum Qualifier	Maximum Concentration (1)	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (2)	Background Value (3)	Screening Toxicity Value (4)	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for Contaminant Deletion or Selection (5)
7440-38-2	Arsenic	2		5.6	-	mg/kg	B-30	3/3	N/P	5.6	2.8	0.31	N/A	N/A	Yes	ASL

(1) Minimum/maximum detected concentration
(2) Maximum concentration used as screening value
(3) Refer to Section 6.3.14 for a discussion of the comparison to background
(4) Sreening toxicity value derived in accordance with State of California Department of Toxic Substances Control *Preliminary Endangerment Assessment Guidance Manual (DTSC 1994) and USEPA Risk Assessment Guidance for Superfund (USEPA 1989) See* Appendix I for methodology.
(5) Rationale Codes Selection Reason:
Above Screening Levels (ASL)

Definitions:
ARAR/TBC = Applicable or Relevant and Appropriate Requirement/To Be Considered
CAS = Chemical Abstract Service
COPC = Chemical of Potential Concern
mg/kg = milligrams per kilogram
N/A = Not applicable
N/P = Not provided by the laboratory performing the analyses

TABLE 6-14
MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATION SUMMARY
Jet Propulsion Laboratory -- Operable Unit-2

Scenario Timeframe: Current
Medium: Soil
Exposure Medium: Soil
Exposure Point: Discharge Point 2

Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL of Normal Data	Maximum Detected Concentration	Maximum Qualifier	EPC Units	Reasonable Maximum Exposure			Central Tendency		
							Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale	Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale
Chromium (VI)	mg/kg	N/A	N/A	0.28		mg/kg	0.28	Max (1)	LDS	N/A	N/A	N/A

(1) Maximum detected value

Definitions: N/A = Not applicable
mg/kg = milligrams per kilogram
UCL = upper confidence limit
EPC = exposure point concentration
LDS = limited data set
% = percent

TABLE 6-15

MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATION SUMMARY

Jet Propulsion Laboratory -- Operable Unit-2

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Soil
Exposure Point: Discharge Point 2

Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL of Normal Data	Maximum Detected Concentration	Maximum Qualifier	EPC Units	Reasonable Maximum Exposure			Central Tendency		
							Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale	Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale
Chromium (VI)	mg/kg	N/A	N/A	0.28		mg/kg	0.28	Max (1)	LDS	N/A	N/A	N/A

(1) Maximum detected value

Definitions: N/A = Not applicable
mg/kg = milligrams per kilogram
UCL = upper confidence limit
EPC = exposure point concentration
LDS = limited data set
% = percent

TABLE 6-16
MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATION SUMMARY
Jet Propulsion Laboratory -- Operable Unit-2

Scenario Timeframe: Current
Medium: Soil
Exposure Medium: Soil
Exposure Point: Waste Pit 4

Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL of Normal Data	Maximum Detected Concentration	Maximum Qualifier	EPC Units	Reasonable Maximum Exposure			Central Tendency		
							Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale	Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale
Arsenic	mg/kg	N/A	N/A	5.6		mg/kg	5.6	Max (1)	LDS	N/A	N/A	N/A

(1) Maximum detected value

Definitions: N/A = Not applicable
mg/kg = milligrams per kilogram
UCL = upper confidence limit
EPC = exposure point concentration
LDS = limited data set
% = percent

TABLE 6-17
MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATION SUMMARY
Jet Propulsion Laboratory -- Operable Unit-2

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Soil
Exposure Point: Discharge Point 3

Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL of Normal Data	Maximum Detected Concentration	Maximum Qualifier	EPC Units	Reasonable Maximum Exposure			Central Tendency		
							Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale	Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale
Arsenic	mg/kg	N/A	N/A	4.5		mg/kg	4.5	Max (1)	LDS	N/A	N/A	N/A

(1) Maximum detected value

Definitions: N/A = Not applicable
mg/kg = milligrams per kilogram
UCL = upper confidence limit
EPC = exposure point concentration
LDS = limited data set
% = percent

TABLE 6-18
MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATION SUMMARY
Jet Propulsion Laboratory – Operable Unit-2

Scenario Timeframe: Current
Medium: Soil
Exposure Medium: Soil
Exposure Point: Discharge Point 4

Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL of Normal Data	Maximum Detected Concentration	Maximum Qualifier	EPC Units	Reasonable Maximum Exposure			Central Tendency		
							Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale	Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale
Arsenic	mg/kg	N/A	N/A	4.7		mg/kg	4.7	Max (1)	LDS	N/A	N/A	N/A

(1) Maximum detected value

Definitions: N/A = Not applicable
mg/kg = milligrams per kilogram
UCL = upper confidence limit
EPC = exposure point concentration
LDS = limited data set
% = percent

TABLE 6-19
MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATION SUMMARY
Jet Propulsion Laboratory -- Operable Unit-2

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Soil
Exposure Point: Discharge Point 4

Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL of Normal Data	Maximum Detected Concentration	Maximum Qualifier	EPC Units	Reasonable Maximum Exposure			Central Tendency		
							Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale	Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale
Arsenic	mg/kg	N/A	N/A	4.7		mg/kg	4.7	Max (1)	LDS	N/A	N/A	N/A

(1) Maximum detected value

Definitions: N/A = Not applicable
mg/kg = milligrams per kilogram
UCL = upper confidence limit
EPC = exposure point concentration
LDS = limited data set
% = percent

TABLE 6-20
MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATION SUMMARY
Jet Propulsion Laboratory -- Operable Unit-2

Scenario Timeframe: Current
Medium: Soil
Exposure Medium: Soil
Exposure Point: Waste Pit 1/Discharge Point 1

Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL of Normal Data	Maximum Detected Concentration	Maximum Qualifier	EPC Units	Reasonable Maximum Exposure			Central Tendency		
							Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale	Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale
Arochlor-1254	mg/kg	N/A	N/A	0.2		mg/kg	0.2	Max (1)	LDS	N/A	N/A	N/A
Arochlor-1260	mg/kg	N/A	N/A	0.27		mg/kg	0.27	Max (1)	LDS	N/A	N/A	N/A
Arsenic	mg/kg	N/A	N/A	3.0		mg/kg	3.0	Max (1)	LDS	N/A	N/A	N/A
Chromium (VI)	mg/kg	N/A	N/A	0.84		mg/kg	0.84	Max (1)	LDS	N/A	N/A	N/A

(1) Maximum detected value

Definitions: N/A = Not applicable
mg/kg = milligrams per kilogram
UCL = upper confidence limit
EPC = exposure point concentration
LDS = limited data set
% = percent

TABLE 6-21

MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATION SUMMARY

Jet Propulsion Laboratory -- Operable Unit-2

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Soil
Exposure Point: Waste Pit 1/Discharge Point 1

Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL of Normal Data	Maximum Detected Concentration	Maximum Qualifier	EPC Units	Reasonable Maximum Exposure			Central Tendency		
							Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale	Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale
Arochlor-1254	mg/kg	N/A	N/A	0.2		mg/kg	0.2	Max (1)	LDS	N/A	N/A	N/A
Arochlor-1260	mg/kg	N/A	N/A	0.27		mg/kg	0.27	Max (1)	LDS	N/A	N/A	N/A
Arsenic	mg/kg	N/A	N/A	3.0		mg/kg	3.0	Max (1)	LDS	N/A	N/A	N/A
Chromium (VI)	mg/kg	N/A	N/A	0.84		mg/kg	0.84	Max (1)	LDS	N/A	N/A	N/A

(1) Maximum detected value

Definitions: N/A = Not applicable
mg/kg = milligrams per kilogram
UCL = upper confidence limit
EPC = exposure point concentration
LDS = limited data set
% = percent

TABLE 6-22
MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATION SUMMARY
Jet Propulsion Laboratory -- Operable Unit-2

Scenario Timeframe: Current
Medium: Soil
Exposure Medium: Soil
Exposure Point: Waste Pit 4

Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL of Normal Data	Maximum Detected Concentration	Maximum Qualifier	EPC Units	Reasonable Maximum Exposure			Central Tendency		
							Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale	Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale
Arsenic	mg/kg	N/A	N/A	5.6		mg/kg	5.6	Max (1)	LDS	N/A	N/A	N/A

(1) Maximum detected value

Definitions: N/A = Not applicable
mg/kg = milligrams per kilogram
UCL = upper confidence limit
EPC = exposure point concentration
LDS = limited data set
% = percent

TABLE 6-23

MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATION SUMMARY

Jet Propulsion Laboratory -- Operable Unit-2

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Soil
Exposure Point: Waste Pit 4

Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL of Normal Data	Maximum Detected Concentration	Maximum Qualifier	EPC Units	Reasonable Maximum Exposure			Central Tendency		
							Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale	Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale
Arsenic	mg/kg	N/A	N/A	5.6		mg/kg	5.6	Max (1)	LDS	N/A	N/A	N/A

(1) Maximum detected value

Definitions: N/A = Not applicable
mg/kg = milligrams per kilogram
UCL = upper confidence limit
EPC = exposure point concentration
LDS = limited data set
% = percent

TABLE 6-24

VALUES USED FOR DAILY INTAKE CALCULATIONS

Jet Propulsion Laboratory – Operable Unit-2

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Soil
Exposure Point: Discharge Point 2
Receptor Population: On-site Resident
Receptor Age: Child/Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Ingestion	CS	Chemical Concentration in Soil	mg/kg	See Table 3	See Table 3	--	--	Chronic Daily Intake (CDI) for carcinogens (mg/kg-day) =
	IRS-A	Ingestion Rate of Soil for Adults	mg/day	100	USEPA 1991	--	--	(CS x IRS-A x EF x ED-A x CF1 x 1/BW-A x 1/AT-C x 1/CF2) +
	IRS-C	Ingestion Rate of Soil for Children	mg/day	200	USEPA 1991	--	--	(CS x IRS-C x EF x ED-C x CF1 x 1/BW-C x 1/AT-C x 1/CF2)
	EF	Exposure Frequency	days/year	350	USEPA 1991	--	--	
	ED-A	Exposure Duration for Adults	years	24	DTSC 1994	--	--	CDI for noncarcinogens (mg/kg-day) =
	ED-C	Exposure Duration for Children	years	6	DTSC 1994	--	--	(CS x IRS-C x EF x ED-C x CF1 x 1/BW-C x 1/AT-N x 1/CF2)
	CF1	Conversion Factor 1	kg/mg	1.00E-06	N/A	--	--	
	CF2	Conversion Factor 2	days/year	365	N/A	--	--	
	BW-A	Body Weight for Adults	kg	70	USEPA 1991	--	--	
	BW-C	Body Weight for Children	kg	15	USEPA 1991	--	--	
	AT-C	Averaging Time (Cancer)	years	70	DTSC 1994	--	--	
	AT-N	Averaging Time (Non-cancer)	years	6	DTSC 1994	--	--	
Dermal	CS	Chemical Concentration in Soil	mg/kg	See Table 3	See Table 3	--	--	CDI for carcinogens (mg/kg-day) =
	CF1	Conversion Factor 1	kg/mg	1.00E-06	N/A	--	--	(CS x SA-A x AF x ABS x EF-A x ED-A x CF1 x
	CF2	Conversion Factor 2	days/year	365	N/A	--	--	1/BW-A x 1/AT-C x1/CF2) +
	AF	Soil to Skin Adherence Factor	mg/cm2	1	USEPA 1992	--	--	(CS x SA-C x AF x ABS x EF-C x ED-C x CF1 x
	ABS	Absorption Fraction of Chemical from Soil	unitless	chemical-specific	DTSC 1994	--	--	1/BW-C x 1/AT-C x 1/CF2)
	SA-A	Skin Surface Area Available for Contact for Adults	cm2/day	5,800	DTSC 1994	--	--	
	SA-C	Skin Surface Area Available for Contact for Children	cm2/day	2,000	DTSC 1994	--	--	CDI for noncarcinogens (mg/kg-day) =
	EF-A	Exposure Frequency for Adults	days/year	100	USEPA 1991	--	--	(CS x SA-C x AF x ABS x EF-C x ED-C x CF1 x
	EF-C	Exposure Frequency for Children	days/year	350	USEPA 1991	--	--	1/BW-C x 1/AT-N x 1/CF2)
	ED-A	Exposure Duration for Adults	years	24	DTSC 1994	--	--	
	ED-C	Exposure Duration for Children	years	6	DTSC 1994	--	--	
	BW-A	Body Weight for Adults	kg	70	USEPA 1991	--	--	
	BW-C	Body Weight for Children	kg	15	USEPA 1991	--	--	
	AT-C	Averaging Time (Cancer)	years	70	DTSC 1994	--	--	
	AT-N	Averaging Time (Non-cancer)	years	6	DTSC 1994	--	--	
On-site Fugitive Dust	CA	Chemical Concentration in Air	mg/m3	See Table 3	See Table 3	--	--	CDI for carcinogens (mg/kg-day) =
	CF2	Conversion Factor 2	days/year	365	N/A	--	--	(CA x ED-A x EF-A x IRA-A x 1/BW-A x 1/AT-C x 1/CF2) +
	IRA-A	Inhalation Rate of Soil for Adults	m3/day	20	USEPA 1991, DTSC 1992	--	--	(CA x ED-C x EF-C x IRA-C x 1/BW-C x 1/AT-C x 1/CF2)
	IRA-C	Inhalation Rate of Soil for Children	m3/day	10	USEPA 1989, DTSC 1992	--	--	
	EF-A	Exposure Frequency for Adults	days/year	100	USEPA 1991	--	--	CDI for noncarcinogens (mg/kg-day) =
	EF-C	Exposure Frequency for Children	days/year	350	USEPA 1991	--	--	(CA x ED-C x EF-C x IRA-C x 1/BW-C x 1/AT-N x 1/CF2)

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
	ED-A	Exposure Duration for Adults	years	24	DTSC 1994	--	--	
	ED-C	Exposure Duration for Children	years	6	DTSC 1994	--	--	
	BW-A	Body Weight for Adults	kg	70	USEPA 1991	--	--	
	BW-C	Body Weight for Children	kg	15	USEPA 1991	--	--	
	AT-C	Averaging Time (Cancer)	years	70	DTSC 1994	--	--	
	AT-N	Averaging Time (Non-cancer)	years	6	DTSC 1994	--	--	
Volatilization into Ambient Air	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

References:

DTSC. 1992. "Default Exposure Parameters". Chapter 1. Supplemental Guidance for Human Health Multimedia Risk Assessment Hazardous Waste Sites and Permitted Facilities. July 1992.

DTSC. 1994. Preliminary Endangerment Assessment Guidance Manual. January 1994.

USEPA. 1989. Risk Assessment Guidance for Superfund, Volume 1: Human Health Evaluation Manual (Part A) Interim Final. EPA/540/1-89/002. Office of Research and Development. Office of Emergency and Remedial Response. December 1989.

USEPA. 1991. Human Health Evaluation Manual, Supplemental Guidance: Standard Default Exposure Factors. March 25, 1991. OSWER Directive 9285.6-03.

USEPA. 1992. Dermal Exposure Assessment: Principles and Applications, Interim Report. Office of Health and Environmental Assessment. EPA 600/8-91-OHB.

Definitions:

-- = Central Tendency not considered
cm2/day = square centimeters per day
CT = Central Tendancy
days/year = days per year
kg = kilogram
kg/mg = kilograms per milligram
m3/day = cubic meters per day
m3/kg = cubic meters per kilogram
mg/cm2 = milligrams per square centimeter
mg/day = milligrams per day
mg/kg = milligrams per kilogram
N/A = Not applicable
RME = Reasonable Maximum Exposure
mg/m3 = milligrams per cubic meter

TABLE 6-25

VALUES USED FOR DAILY INTAKE CALCULATIONS

Jet Propulsion Laboratory -- Operable Unit-2

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Soil
Exposure Point: Discharge Point # 3
Receptor Population: On-site Resident
Receptor Age: Child/Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Ingestion	CS	Chemical Concentration in Soil	mg/kg	See Table 3	See Table 3	--	--	Chronic Daily Intake (CDI) for carcinogens (mg/kg-day) =
	IRS-A	Ingestion Rate of Soil for Adults	mg/day	100	USEPA 1991	--	--	(CS x IRS-A x EF x ED-A x CF1 x 1/BW-A x 1/AT-C x 1/CF2) +
	IRS-C	Ingestion Rate of Soil for Children	mg/day	200	USEPA 1991	--	--	(CS x IRS-C x EF x ED-C x CF1 x 1/BW-C x 1/AT-C x 1/CF2)
	EF	Exposure Frequency	days/year	350	USEPA 1991	--	--	
	ED-A	Exposure Duration for Adults	years	24	DTSC 1994	--	--	CDI for noncarcinogens (mg/kg-day) =
	ED-C	Exposure Duration for Children	years	6	DTSC 1994	--	--	(CS x IRS-C x EF x ED-C x CF1 x 1/BW-C x 1/AT-N x 1/CF2)
	CF1	Conversion Factor 1	kg/mg	1.00E-06	N/A	--	--	
	CF2	Conversion Factor 2	days/year	365	N/A	--	--	
	BW-A	Body Weight for Adults	kg	70	USEPA 1991	--	--	
	BW-C	Body Weight for Children	kg	15	USEPA 1991	--	--	
	AT-C	Averaging Time (Cancer)	years	70	DTSC 1994	--	--	
	AT-N	Averaging Time (Non-cancer)	years	6	DTSC 1994	--	--	
Dermal	CS	Chemical Concentration in Soil	mg/kg	See Table 3	See Table 3	--	--	CDI for carcinogens (mg/kg-day) =
	CF1	Conversion Factor 1	kg/mg	1.00E-06	N/A	--	--	(CS x SA-A x AF x ABS x EF-A x ED-A x CF1 x
	CF2	Conversion Factor 2	days/year	365	N/A	--	--	1/BW-A x 1/AT-C x1/CF2) +
	AF	Soil to Skin Adherence Factor	mg/cm2	1	USEPA 1992	--	--	(CS x SA-C x AF x ABS x EF-C x ED-C x CF1 x
	ABS	Absorption Fraction of Chemical from Soil	unitless	chemical-specific	DTSC 1994	--	--	1/BW-C x 1/AT-C x 1/CF2)
	SA-A	Skin Surface Area Available for Contact for Adults	cm2/day	5,800	DTSC 1994	--	--	
	SA-C	Skin Surface Area Available for Contact for Children	cm2/day	2,000	DTSC 1994	--	--	CDI for noncarcinogens (mg/kg-day) =
	EF-A	Exposure Frequency for Adults	days/year	100	USEPA 1991	--	--	(CS x SA-C x AF x ABS x EF-C x ED-C x CF1 x
	EF-C	Exposure Frequency for Children	days/year	350	USEPA 1991	--	--	1/BW-C x 1/AT-N x 1/CF2)
	ED-A	Exposure Duration for Adults	years	24	DTSC 1994	--	--	
	ED-C	Exposure Duration for Children	years	6	DTSC 1994	--	--	
	BW-A	Body Weight for Adults	kg	70	USEPA 1991	--	--	
	BW-C	Body Weight for Children	kg	15	USEPA 1991	--	--	
	AT-C	Averaging Time (Cancer)	years	70	DTSC 1994	--	--	
	AT-N	Averaging Time (Non-cancer)	years	6	DTSC 1994	--	--	
On-site Fugitive Dust	CA	Chemical Concentration in Air	mg/m3	See Table 3	See Table 3	--	--	CDI for carcinogens (mg/kg-day) =
	CF2	Conversion Factor 2	days/year	365	N/A	--	--	(CA x ED-A x EF-A x IRA-A x 1/BW-A x 1/AT-C x 1/CF2) +
	IRA-A	Inhalation Rate of Soil for Adults	m3/day	20	USEPA 1991, DTSC 1992	--	--	(CA x ED-C x EF-C x IRA-C x 1/BW-C x 1/AT-C x 1/CF2)
	IRA-C	Inhalation Rate of Soil for Children	m3/day	10	USEPA 1989, DTSC 1992	--	--	
	EF-A	Exposure Frequency for Adults	days/year	100	USEPA 1991	--	--	CDI for noncarcinogens (mg/kg-day) =
	EF-C	Exposure Frequency for Children	days/year	350	USEPA 1991	--	--	(CA x ED-C x EF-C x IRA-C x 1/BW-C x 1/AT-N x 1/CF2)
	ED-A	Exposure Duration for Adults	years	24	DTSC 1994	--	--	
	ED-C	Exposure Duration for Children	years	6	DTSC 1994	--	--	
	BW-A	Body Weight for Adults	kg	70	USEPA 1991	--	--	

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
	BW-C	Body Weight for Children	kg	15	USEPA 1991	--	--	
	AT-C	Averaging Time (Cancer)	years	70	DTSC 1994	--	--	
	AT-N	Averaging Time (Non-cancer)	years	6	DTSC 1994	--	--	
Volatilization into Ambient Air	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

References:

DTSC. 1992. "Default Exposure Parameters". Chapter 1. *Supplemental Guidance for Human Health Multimedia Risk Assessment Hazardous Waste Sites and Permitted Facilities*. July 1992.

DTSC. 1994. *Preliminary Endangerment Assessment Guidance Manual*. January 1994.

USEPA. 1989. *Risk Assessment Guidance for Superfund, Volume 1: Human Health Evaluation Manual (Part A) Interim Final.* EPA/540/1-89/002. Office of Research and Development. Office of Emergency and Remedial Response. December 1989.

USEPA. 1991. *Human Health Evaluation Manual, Supplemental Guidance: Standard Default Exposure Factors.* March 25, 1991. OSWER Directive 9285.6-03.

USEPA. 1992. *Dermal Exposure Assessment: Principles and Applications, Interim Report*. Office of Health and Environmental Assessment. EPA 600/8-91-OHB.

Definitions:

-- = Central Tendency not considered
cm2/day = square centimeters per day
CT = Central Tendancy
days/year = days per year
kg = kilogram
kg/mg = kilograms per milligram
m3/day = cubic meters per day
m3/kg = cubic meters per kilogram
mg/cm2 = milligrams per square centimeter
mg/day = milligrams per day
mg/kg = milligrams per kilogram
N/A = Not applicable
RME = Reasonable Maximum Exposure
mg/m3 = milligrams per cubic meter

TABLE 6-26

VALUES USED FOR DAILY INTAKE CALCULATIONS

Jet Propulsion Laboratory -- Operable Unit-2

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Soil
Exposure Point: Discharge Point # 4
Receptor Population: On-site Resident
Receptor Age: Child/Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Ingestion	CS	Chemical Concentration in Soil	mg/kg	See Table 3	See Table 3	--	--	Chronic Daily Intake (CDI) for carcinogens (mg/kg-day) =
	IRS-A	Ingestion Rate of Soil for Adults	mg/day	100	USEPA 1991	--	--	(CS x IRS-A x EF x ED-A x CF1 x 1/BW-A x 1/AT-C x 1/CF2) +
	IRS-C	Ingestion Rate of Soil for Children	mg/day	200	USEPA 1991	--	--	(CS x IRS-C x EF x ED-C x CF1 x 1/BW-C x 1/AT-C x 1/CF2)
	EF	Exposure Frequency	days/year	350	USEPA 1991	--	--	
	ED-A	Exposure Duration for Adults	years	24	DTSC 1994	--	--	CDI for noncarcinogens (mg/kg-day) =
	ED-C	Exposure Duration for Children	years	6	DTSC 1994	--	--	(CS x IRS-C x EF x ED-C x CF1 x 1/BW-C x 1/AT-N x 1/CF2)
	CF1	Conversion Factor 1	kg/mg	1.00E-06	N/A	--	--	
	CF2	Conversion Factor 2	days/year	365	N/A	--	--	
	BW-A	Body Weight for Adults	kg	70	USEPA 1991	--	--	
	BW-C	Body Weight for Children	kg	15	USEPA 1991	--	--	
	AT-C	Averaging Time (Cancer)	years	70	DTSC 1994	--	--	
	AT-N	Averaging Time (Non-cancer)	years	6	DTSC 1994	--	--	
Dermal	CS	Chemical Concentration in Soil	mg/kg	See Table 3	See Table 3	--	--	CDI for carcinogens (mg/kg-day) =
	CF1	Conversion Factor 1	kg/mg	1.00E-06	N/A	--	--	(CS x SA-A x AF x ABS x EF-A x ED-A x CF1 x
	CF2	Conversion Factor 2	days/year	365	N/A	--	--	1/BW-A x 1/AT-C x1/CF2) +
	AF	Soil to Skin Adherence Factor	mg/cm2	1	USEPA 1992	--	--	(CS x SA-C x AF x ABS x EF-C x ED-C x CF1 x
	ABS	Absorption Fraction of Chemical from Soil	unitless	chemical-specific	DTSC 1994	--	--	1/BW-C x 1/AT-C x 1/CF2)
	SA-A	Skin Surface Area Available for Contact for Adults	cm2/day	5,800	DTSC 1994	--	--	
	SA-C	Skin Surface Area Available for Contact for Children	cm2/day	2,000	DTSC 1994	--	--	CDI for noncarcinogens (mg/kg-day) =
	EF-A	Exposure Frequency for Adults	days/year	100	USEPA 1991	--	--	(CS x SA-C x AF x ABS x EF-C x ED-C x CF1 x
	EF-C	Exposure Frequency for Children	days/year	350	USEPA 1991	--	--	1/BW-C x 1/AT-N x 1/CF2)
	ED-A	Exposure Duration for Adults	years	24	DTSC 1994	--	--	
	ED-C	Exposure Duration for Children	years	6	DTSC 1994	--	--	
	BW-A	Body Weight for Adults	kg	70	USEPA 1991	--	--	
	BW-C	Body Weight for Children	kg	15	USEPA 1991	--	--	
	AT-C	Averaging Time (Cancer)	years	70	DTSC 1994	--	--	
	AT-N	Averaging Time (Non-cancer)	years	6	DTSC 1994	--	--	
On-site Fugitive Dust	CA	Chemical Concentration in Air	mg/m3	See Table 3	See Table 3	--	--	CDI for carcinogens (mg/kg-day) =
	CF2	Conversion Factor 2	days/year	365	N/A	--	--	(CA x ED-A x EF-A x IRA-A x 1/BW-A x 1/AT-C x 1/CF2) +
	IRA-A	Inhalation Rate of Soil for Adults	m3/day	20	USEPA 1991, DTSC 1992	--	--	(CA x ED-C x EF-C x IRA-C x 1/BW-C x 1/AT-C x 1/CF2)
	IRA-C	Inhalation Rate of Soil for Children	m3/day	10	USEPA 1989, DTSC 1992	--	--	
	EF-A	Exposure Frequency for Adults	days/year	100	USEPA 1991	--	--	CDI for noncarcinogens (mg/kg-day) =
	EF-C	Exposure Frequency for Children	days/year	350	USEPA 1991	--	--	(CA x ED-C x EF-C x IRA-C x 1/BW-C x 1/AT-N x 1/CF2)
	ED-A	Exposure Duration for Adults	years	24	DTSC 1994	--	--	
	ED-C	Exposure Duration for Children	years	6	DTSC 1994	--	--	
	BW-A	Body Weight for Adults	kg	70	USEPA 1991	--	--	

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
	BW-C	Body Weight for Children	kg	15	USEPA 1991	--	--	
	AT-C	Averaging Time (Cancer)	years	70	DTSC 1994	--	--	
	AT-N	Averaging Time (Non-cancer)	years	6	DTSC 1994	--	--	
Volatilization into Ambient Air	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

References:

DTSC. 1992. "Default Exposure Parameters". Chapter 1. *Supplemental Guidance for Human Health Multimedia Risk Assessment Hazardous Waste Sites and Permitted Facilities*. July 1992.

DTSC. 1994. *Preliminary Endangerment Assessment Guidance Manual*. January 1994.

USEPA. 1989. *Risk Assessment Guidance for Superfund, Volume 1: Human Health Evaluation Manual (Part A) Interim Final.* EPA/540/1-89/002. Office of Research and Development. Office of Emergency and Remedial Response. December 1989.

USEPA. 1991. *Human Health Evaluation Manual, Supplemental Guidance: Standard Default Exposure Factors.* March 25, 1991. OSWER Directive 9285.6-03.

USEPA. 1992. *Dermal Exposure Assessment: Principles and Applications, Interim Report*. Office of Health and Environmental Assessment. EPA 600/8-91-OH8.

Definitions:

-- = Central Tendency not considered
cm2/day = square centimeters per day
CT = Central Tendancy
days/year = days per year
kg = kilogram
kg/mg = kilograms per milligram
m3/day = cubic meters per day
m3/kg = cubic meters per kilogram
mg/cm2 = milligrams per square centimeter
mg/day = milligrams per day
mg/kg = milligrams per kilogram
N/A = Not applicable
RME = Reasonable Maximum Exposure
mg/m3 = milligrams per cubic meter

TABLE 6-27

VALUES USED FOR DAILY INTAKE CALCULATIONS

Jet Propulsion Laboratory -- Operable Unit-2

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Soil
Exposure Point: Waste Pit 1/Discharge Point 1
Receptor Population: On-site Resident
Receptor Age: Child/Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Ingestion	CS	Chemical Concentration in Soil	mg/kg	See Table 3	See Table 3	--	--	Chronic Daily Intake (CDI) for carcinogens (mg/kg-day) =
	IRS-A	Ingestion Rate of Soil for Adults	mg/day	100	USEPA 1991	--	--	(CS x IRS-A x EF x ED-A x CF1 x 1/BW-A x 1/AT-C x 1/CF2) +
	IRS-C	Ingestion Rate of Soil for Children	mg/day	200	USEPA 1991	--	--	(CS x IRS-C x EF x ED-C x CF1 x 1/BW-C x 1/AT-C x 1/CF2)
	EF	Exposure Frequency	days/year	350	USEPA 1991	--	--	
	ED-A	Exposure Duration for Adults	years	24	DTSC 1994	--	--	CDI for noncarcinogens (mg/kg-day) =
	ED-C	Exposure Duration for Children	years	6	DTSC 1994	--	--	(CS x IRS-C x EF x ED-C x CF1 x 1/BW-C x 1/AT-N x 1/CF2)
	CF1	Conversion Factor 1	kg/mg	1.00E-06	N/A	--	--	
	CF2	Conversion Factor 2	days/year	365	N/A	--	--	
	BW-A	Body Weight for Adults	kg	70	USEPA 1991	--	--	
	BW-C	Body Weight for Children	kg	15	USEPA 1991	--	--	
	AT-C	Averaging Time (Cancer)	years	70	DTSC 1994	--	--	
	AT-N	Averaging Time (Non-cancer)	years	6	DTSC 1994	--	--	
Dermal	CS	Chemical Concentration in Soil	mg/kg	See Table 3	See Table 3	--	--	CDI for carcinogens (mg/kg-day) =
	CF1	Conversion Factor 1	kg/mg	1.00E-06	N/A	--	--	(CS x SA-A x AF x ABS x EF-A x ED-A x CF1 x
	CF2	Conversion Factor 2	days/year	365	N/A	--	--	1/BW-A x 1/AT-C x1/CF2) +
	AF	Soil to Skin Adherence Factor	mg/cm2	1	USEPA 1992	--	--	(CS x SA-C x AF x ABS x EF-C x ED-C x CF1 x
	ABS	Absorption Fraction of Chemical from Soil	unitless	chemical-specific	DTSC 1994	--	--	1/BW-C x 1/AT-C x 1/CF2)
	SA-A	Skin Surface Area Available for Contact for Adults	cm2/day	5,800	DTSC 1994	--	--	
	SA-C	Skin Surface Area Available for Contact for Children	cm2/day	2,000	DTSC 1994	--	--	CDI for noncarcinogens (mg/kg-day) =
	EF-A	Exposure Frequency for Adults	days/year	100	USEPA 1991	--	--	(CS x SA-C x AF x ABS x EF-C x ED-C x CF1 x
	EF-C	Exposure Frequency for Children	days/year	350	USEPA 1991	--	--	1/BW-C x 1/AT-N x 1/CF2)
	ED-A	Exposure Duration for Adults	years	24	DTSC 1994	--	--	
	ED-C	Exposure Duration for Children	years	6	DTSC 1994	--	--	
	BW-A	Body Weight for Adults	kg	70	USEPA 1991	--	--	
	BW-C	Body Weight for Children	kg	15	USEPA 1991	--	--	
	AT-C	Averaging Time (Cancer)	years	70	DTSC 1994	--	--	
	AT-N	Averaging Time (Non-cancer)	years	6	DTSC 1994	--	--	
On-site Fugitive Dust	CA	Chemical Concentration in Air	mg/m3	See Table 3	See Table 3	--	--	CDI for carcinogens (mg/kg-day) =
	CF2	Conversion Factor 2	days/year	365	N/A	--	--	(CA x ED-A x EF-A x IRA-A x 1/BW-A x 1/AT-C x 1/CF2) +
	IRA-A	Inhalation Rate of Soil for Adults	m3/day	20	USEPA 1991, DTSC 1992	--	--	(CA x ED-C x EF-C x IRA-C x 1/BW-C x 1/AT-C x 1/CF2)
	IRA-C	Inhalation Rate of Soil for Children	m3/day	10	USEPA 1989, DTSC 1992	--	--	
	EF-A	Exposure Frequency for Adults	days/year	100	USEPA 1991	--	--	CDI for noncarcinogens (mg/kg-day) =
	EF-C	Exposure Frequency for Children	days/year	350	USEPA 1991	--	--	(CA x ED-C x EF-C x IRA-C x 1/BW-C x 1/AT-N x 1/CF2)
	ED-A	Exposure Duration for Adults	years	24	DTSC 1994	--	--	
	ED-C	Exposure Duration for Children	years	6	DTSC 1994	--	--	
	BW-A	Body Weight for Adults	kg	70	USEPA 1991	--	--	

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
	BW-C	Body Weight for Children	kg	15	USEPA 1991	--	--	
	AT-C	Averaging Time (Cancer)	years	70	DTSC 1994	--	--	
	AT-N	Averaging Time (Non-cancer)	years	6	DTSC 1994	--	--	
Volatilization into Ambient Air	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

References:

DTSC. 1992. "Default Exposure Parameters". Chapter 1. *Supplemental Guidance for Human Health Multimedia Risk Assessment Hazardous Waste Sites and Permitted Facilities*. July 1992.

DTSC. 1994. *Preliminary Endangerment Assessment Guidance Manual*. January 1994.

USEPA. 1989. *Risk Assessment Guidance for Superfund, Volume 1: Human Health Evaluation Manual (Part A) Interim Final.* EPA/540/1-89/002. Office of Research and Development. Office of Emergency and Remedial Response. December 1989.

USEPA. 1991. *Human Health Evaluation Manual, Supplemental Guidance: Standard Default Exposure Factors.* March 25, 1991. OSWER Directive 9285.6-03.

USEPA. 1992. *Dermal Exposure Assessment: Principles and Applications, Interim Report*. Office of Health and Environmental Assessment. EPA 600/8-91-OHB.

Definitions:

-- = Central Tendency not considered
cm2/day = square centimeters per day
CT = Central Tendancy
days/year = days per year
kg = kilogram
kg/mg = kilograms per milligram
m3/day = cubic meters per day
m3/kg = cubic meters per kilogram
mg/cm2 = milligrams per square centimeter
mg/day = milligrams per day
mg/kg = milligrams per kilogram
N/A = Not applicable
RME = Reasonable Maximum Exposure
mg/m3 = milligrams per cubic meter

TABLE 6-28

VALUES USED FOR DAILY INTAKE CALCULATIONS

Jet Propulsion Laboratory -- Operable Unit-2

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Soil
Exposure Point: Waste Pit 4
Receptor Population: On-site Resident
Receptor Age: Child/Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Ingestion	CS	Chemical Concentration in Soil	mg/kg	See Table 3	See Table 3	--	--	Chronic Daily Intake (CDI) for carcinogens (mg/kg-day) =
	IRS-A	Ingestion Rate of Soil for Adults	mg/day	100	USEPA 1991	--	--	(CS x IRS-A x EF x ED-A x CF1 x 1/BW-A x 1/AT-C x 1/CF2) +
	IRS-C	Ingestion Rate of Soil for Children	mg/day	200	USEPA 1991	--	--	(CS x IRS-C x EF x ED-C x CF1 x 1/BW-C x 1/AT-C x 1/CF2)
	EF	Exposure Frequency	days/year	350	USEPA 1991	--	--	
	ED-A	Exposure Duration for Adults	years	24	DTSC 1994	--	--	CDI for noncarcinogens (mg/kg-day) =
	ED-C	Exposure Duration for Children	years	6	DTSC 1994	--	--	(CS x IRS-C x EF x ED-C x CF1 x 1/BW-C x 1/AT-N x 1/CF2)
	CF1	Conversion Factor 1	kg/mg	1.00E-06	N/A	--	--	
	CF2	Conversion Factor 2	days/year	365	N/A	--	--	
	BW-A	Body Weight for Adults	kg	70	USEPA 1991	--	--	
	BW-C	Body Weight for Children	kg	15	USEPA 1991	--	--	
	AT-C	Averaging Time (Cancer)	years	70	DTSC 1994	--	--	
	AT-N	Averaging Time (Non-cancer)	years	6	DTSC 1994	--	--	
Dermal	CS	Chemical Concentration in Soil	mg/kg	See Table 3	See Table 3	--	--	CDI for carcinogens (mg/kg-day) =
	CF1	Conversion Factor 1	kg/mg	1.00E-06	N/A	--	--	(CS x SA-A x AF x ABS x EF-A x ED-A x CF1 x
	CF2	Conversion Factor 2	days/year	365	N/A	--	--	1/BW-A x 1/AT-C x1/CF2) +
	AF	Soil to Skin Adherence Factor	mg/cm2	1	USEPA 1992	--	--	(CS x SA-C x AF x ABS x EF-C x ED-C x CF1 x
	ABS	Absorption Fraction of Chemical from Soil	unitless	chemical-specific	DTSC 1994	--	--	1/BW-C x 1/AT-C x 1/CF2)
	SA-A	Skin Surface Area Available for Contact for Adults	cm2/day	5,800	DTSC 1994	--	--	
	SA-C	Skin Surface Area Available for Contact for Children	cm2/day	2,000	DTSC 1994	--	--	CDI for noncarcinogens (mg/kg-day) =
	EF-A	Exposure Frequency for Adults	days/year	100	USEPA 1991	--	--	(CS x SA-C x AF x ABS x EF-C x ED-C x CF1 x
	EF-C	Exposure Frequency for Children	days/year	350	USEPA 1991	--	--	1/BW-C x 1/AT-N x 1/CF2)
	ED-A	Exposure Duration for Adults	years	24	DTSC 1994	--	--	
	ED-C	Exposure Duration for Children	years	6	DTSC 1994	--	--	
	BW-A	Body Weight for Adults	kg	70	USEPA 1991	--	--	
	BW-C	Body Weight for Children	kg	15	USEPA 1991	--	--	
	AT-C	Averaging Time (Cancer)	years	70	DTSC 1994	--	--	
	AT-N	Averaging Time (Non-cancer)	years	6	DTSC 1994	--	--	
On-site Fugitive Dust	CA	Chemical Concentration in Air	mg/m3	See Table 3	See Table 3	--	--	CDI for carcinogens (mg/kg-day) =
	CF2	Conversion Factor 2	days/year	365	N/A	--	--	(CA x ED-A x EF-A x IRA-A x 1/BW-A x 1/AT-C x 1/CF2) +
	IRA-A	Inhalation Rate of Soil for Adults	m3/day	20	USEPA 1991, DTSC 1992	--	--	(CA x ED-C x EF-C x IRA-C x 1/BW-C x 1/AT-C x 1/CF2)
	IRA-C	Inhalation Rate of Soil for Children	m3/day	10	USEPA 1989, DTSC 1992	--	--	
	EF-A	Exposure Frequency for Adults	days/year	100	USEPA 1991	--	--	CDI for noncarcinogens (mg/kg-day) =
	EF-C	Exposure Frequency for Children	days/year	350	USEPA 1991	--	--	(CA x ED-C x EF-C x IRA-C x 1/BW-C x 1/AT-N x 1/CF2)
	ED-A	Exposure Duration for Adults	years	24	DTSC 1994	--	--	

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
	ED-C	Exposure Duration for Children	years	6	DTSC 1994	--	--	
	BW-A	Body Weight for Adults	kg	70	USEPA 1991	--	--	
	BW-C	Body Weight for Children	kg	15	USEPA 1991	--	--	
	AT-C	Averaging Time (Cancer)	years	70	DTSC 1994	--	--	
	AT-N	Averaging Time (Non-cancer)	years	6	DTSC 1994	--	--	
Volatilization into Ambient Air	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

References:

DTSC. 1992. "Default Exposure Parameters". Chapter 1. *Supplemental Guidance for Human Health Multimedia Risk Assessment Hazardous Waste Sites and Permitted Facilities*. July 1992.

DTSC. 1994. *Preliminary Endangerment Assessment Guidance Manual*. January 1994.

USEPA. 1989. *Risk Assessment Guidance for Superfund, Volume 1: Human Health Evaluation Manual (Part A) Interim Final.* EPA/540/1-89/002. Office of Research and Development. Office of Emergency and Remedial Response. December 1989.

USEPA. 1991. *Human Health Evaluation Manual, Supplemental Guidance: Standard Default Exposure Factors.* March 25, 1991. OSWER Directive 9285.6-03.

USEPA. 1992. *Dermal Exposure Assessment: Principles and Applications, Interim Report*. Office of Health and Environmental Assessment. EPA 600/8-91-OHB.

Definitions:

-- = Central Tendency not considered
cm2/day = square centimeters per day
CT = Central Tendancy
days/year = days per year
kg = kilogram
kg/mg = kilograms per milligram
m3/day = cubic meters per day
m3/kg = cubic meters per kilogram
mg/cm2 = milligrams per square centimeter
mg/day = milligrams per day
mg/kg = milligrams per kilogram
N/A = Not applicable
RME = Reasonable Maximum Exposure
mg/m3 = milligrams per cubic meter

TABLE 6-29

VALUES USED FOR DAILY INTAKE CALCULATIONS

Jet Propulsion Laboratory -- Operable Unit-2

Scenario Timeframe: Current
Medium: Soil
Exposure Medium: Soil
Exposure Point: Discharge Point 2
Receptor Population: Construction Worker
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Ingestion	CS	Chemical Concentration in Soil	mg/kg	See Table 3	See Table 3	--	--	Chronic Daily Intake (CDI) (mg/kg-day) =
	IRS	Ingestion Rate of Soil	mg/day	480	USEPA 1991	--	--	CS x IRS x EF x ED x CF1 x FI x 1/BW x 1/AT x 1/CF2
	EF	Exposure Frequency	days/year	250	USEPA 1989, DTSC 1992	--	--	
	ED	Exposure Duration	years	1	Best professional judgement	--	--	
	CF1	Conversion Factor 1	kg/mg	1.00E-06	N/A	--	--	
	CF2	Conversion Factor 2	days/year	365	N/A	--	--	
	FI	Fraction Ingested from Contaminated Source	unitless	0.25	Best professional judgement	--	--	
	BW	Body Weight	kg	70	USEPA 1989, DTSC 1992	--	--	
	AT-C	Averaging Time (Cancer)	years	70	USEPA 1989, DTSC 1992	--	--	
	AT-N	Averaging Time (Non-cancer)	years	1	Best professional judgement	--	--	
Dermal	CS	Chemical Concentration in Soil	mg/kg	See Table 3	See Table 3	--	--	CDI (mg/kg-day) =
	CF1	Conversion Factor 1	kg/mg	1.00E-06	N/A	--	--	CS x SA x AF x ABS x EF x ED x CF1 x
	CF2	Conversion Factor 2	days/year	365	N/A	--	--	1/BW x 1/AT x 1/CF2
	AF	Soil to Skin Adherence Factor	mg/cm2	0.5	USEPA 1992	--	--	
	ABS	Absorption Factor	unitless	chemical-specific		--	--	
	SA	Skin Surface Area Available for Contact	cm2/day	5,000	Calculated	--	--	
	EF	Exposure Frequency	days/year	250	USEPA 1989, DTSC 1992	--	--	
	ED	Exposure Duration	years	1	Best professional judgement	--	--	
	BW	Body Weight	kg	70	USEPA 1989, DTSC 1992	--	--	
	AT-C	Averaging Time (Cancer)	years	70	USEPA 1989, DTSC 1992	--	--	
	AT-N	Averaging Time (Non-cancer)	years	1	Best professional judgement	--	--	
On- site Fugitive Dust Generation	CA	Chemical Concentration in Air	mg/m3	See Table 3	See Table 3	--	--	CDI (mg/kg-day) =
	CF2	Conversion Factor 2	days/year	365	N/A	--	--	CA x ED x EF x IRA x 1/BW x 1/AT x 1/CF2
	IRA	Inhalation Rate of Soil	m3/day	20	USEPA 1989, DTSC 1992	--	--	
	EF	Exposure Frequency	days/year	250	USEPA 1989, DTSC 1992	--	--	

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
	ED	Exposure Duration	years	1	Best professional judgement	--	--	
	BW	Body Weight	kg	70	USEPA 1989, DTSC 1992	--	--	
	AT-C	Averaging Time (Cancer)	years	70	USEPA 1989, DTSC 1992	--	--	
	AT-N	Averaging Time (Non-cancer)	years	1	Best professional judgement	--	--	
Volatilization into Ambient Air	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

References:

DTSC. 1992. "Default Exposure Parameters". Chapter 1. Supplemental Guidance for Human Health Multimedia Risk Assessment Hazardous Waste Sites and Permitted Facilities. July 1992.

USEPA. 1989. Risk Assessment Guidance for Superfund, Volume 1: Human Health Evaluation Manual (Part A) Interim Final. EPA/540/1-89/002. Office of Research and Development. Office of Emergency and Remedial Response. December 1989.

USEPA. 1991. Human Health Evaluation Manual, Supplemental Guidance: Standard Default Exposure Factors. March 25, 1991. OSWER Directive 9285.6-03.

USEPA. 1992. Dermal Exposure Assessment: Principles and Applications, Interim Report. Office of Health and Environmental Assessment. EPA 600/8-91-OHB.

Definitions:

-- = Central Tendency not considered

cm2/day = square centimeters per day

CT = Central Tendancy

days/year = days per year

kg = kilogram

kg/mg = kilograms per milligram

m3/day = cubic meters per day

m3/kg = cubic meters per kilogram

mg/cm2 = milligrams per square centimeter

mg/day = milligrams per day

mg/kg = milligrams per kilogram

N/A = Not applicable

RME = Reasonable Maximum Exposure

mg/m3 = milligrams per cubic meter

TABLE 6-30

VALUES USED FOR DAILY INTAKE CALCULATIONS

Jet Propulsion Laboratory – Operable Unit-2

Scenario Timeframe: Current
Medium: Soil
Exposure Medium: Soil
Exposure Point: Discharge Point 3
Receptor Population: Construction Worker
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Ingestion	CS	Chemical Concentration in Soil	mg/kg	See Table 3	See Table 3	--	--	Chronic Daily Intake (CDI) (mg/kg-day) =
	IRS	Ingestion Rate of Soil	mg/day	480	USEPA 1991	--	--	CS x IRS x EF x ED x CF1 x FI x 1/BW x 1/AT x 1/CF2
	EF	Exposure Frequency	days/year	250	USEPA 1989, DTSC 1992	--	--	
	ED	Exposure Duration	years	1	Best professional judgement	--	--	
	CF1	Conversion Factor 1	kg/mg	1.00E-06	N/A	--	--	
	CF2	Conversion Factor 2	days/year	365	N/A	--	--	
	FI	Fraction Ingested from Contaminated Source	unitless	0.25	Best professional judgement	--	--	
	BW	Body Weight	kg	70	USEPA 1989, DTSC 1992	--	--	
	AT-C	Averaging Time (Cancer)	years	70	USEPA 1989, DTSC 1992	--	--	
	AT-N	Averaging Time (Non-cancer)	years	1	Best professional judgement	--	--	
Dermal	CS	Chemical Concentration in Soil	mg/kg	See Table 3	See Table 3	--	--	CDI (mg/kg-day) =
	CF1	Conversion Factor 1	kg/mg	1.00E-06	N/A	--	--	CS x SA x AF x ABS x EF x ED x CF1 x
	CF2	Conversion Factor 2	days/year	365	N/A	--	--	1/BW x 1/AT x 1/CF2
	AF	Soil to Skin Adherence Factor	mg/cm2	0.5	USEPA 1992	--	--	
	ABS	Absorption Factor	unitless	chemical-specific		--	--	
	SA	Skin Surface Area Available for Contact	cm2/day	5,000	Calculated	--	--	
	EF	Exposure Frequency	days/year	250	USEPA 1989, DTSC 1992	--	--	
	ED	Exposure Duration	years	1	Best professional judgement	--	--	
	BW	Body Weight	kg	70	USEPA 1989, DTSC 1992	--	--	
	AT-C	Averaging Time (Cancer)	years	70	USEPA 1989, DTSC 1992	--	--	
	AT-N	Averaging Time (Non-cancer)	years	1	Best professional judgement	--	--	
On- site Fugitive Dust Generation	CA	Chemical Concentration in Air	mg/m3	See Table 3	See Table 3	--	--	CDI (mg/kg-day) =
	CF2	Conversion Factor 2	days/year	365	N/A	--	--	CA x ED x EF x IRA x 1/BW x 1/AT x 1/CF2
	IRA	Inhalation Rate of Soil	m3/day	20	USEPA 1989, DTSC 1992	--	--	
	EF	Exposure Frequency	days/year	250	USEPA 1989, DTSC 1992	--	--	

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
	ED	Exposure Duration	years	1	Best professional judgement	--	--	
	BW	Body Weight	kg	70	USEPA 1989, DTSC 1992	--	--	
	AT-C	Averaging Time (Cancer)	years	70	USEPA 1989, DTSC 1992	--	--	
	AT-N	Averaging Time (Non-cancer)	years	1	Best professional judgement	--	--	
Volatilization into Ambient Air	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

References:

DTSC. 1992. "Default Exposure Parameters". Chapter 1. Supplemental Guidance for Human Health Multimedia Risk Assessment Hazardous Waste Sites and Permitted Facilities. July 1992.

USEPA. 1989. Risk Assessment Guidance for Superfund, Volume 1: Human Health Evaluation Manual (Part A) Interim Final. EPA/540/1-89/002. Office of Research and Development. Office of Emergency and Remedial Response. December 1989.

USEPA. 1991. Human Health Evaluation Manual, Supplemental Guidance: Standard Default Exposure Factors. March 25, 1991. OSWER Directive 9285.6-03.

USEPA. 1992. Dermal Exposure Assessment: Principles and Applications, Interim Report. Office of Health and Environmental Assessment. EPA 600/8-91-OHB.

Definitions:

-- = Central Tendency not considered

cm2/day = square centimeters per day

CT = Central Tendancy

days/year = days per year

kg = kilogram

kg/mg = kilograms per milligram

m3/day = cubic meters per day

m3/kg = cubic meters per kilogram

mg/cm2 = milligrams per square centimeter

mg/day = milligrams per day

mg/kg = milligrams per kilogram

N/A = Not applicable

RME = Reasonable Maximum Exposure

mg/m3 = milligrams per cubic meter

TABLE 6-31

VALUES USED FOR DAILY INTAKE CALCULATIONS

Jet Propulsion Laboratory -- Operable Unit-2

Scenario Timeframe: Current
Medium: Soil
Exposure Medium: Soil
Exposure Point: Discharge Point 4
Receptor Population: Construction Worker
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Ingestion	CS	Chemical Concentration in Soil	mg/kg	See Table 3	See Table 3	--	--	Chronic Daily Intake (CDI) (mg/kg-day) =
	IRS	Ingestion Rate of Soil	mg/day	480	USEPA 1991	--	--	CS x IRS x EF x ED x CF1 x FI x 1/BW x 1/AT x 1/CF2
	EF	Exposure Frequency	days/year	250	USEPA 1989, DTSC 1992	--	--	
	ED	Exposure Duration	years	1	Best professional judgement	--	--	
	CF1	Conversion Factor 1	kg/mg	1.00E-06	N/A	--	--	
	CF2	Conversion Factor 2	days/year	365	N/A	--	--	
	FI	Fraction Ingested from Contaminated Source	unitless	0.25	Best professional judgement	--	--	
	BW	Body Weight	kg	70	USEPA 1989, DTSC 1992	--	--	
	AT-C	Averaging Time (Cancer)	years	70	USEPA 1989, DTSC 1992	--	--	
	AT-N	Averaging Time (Non-cancer)	years	1	Best professional judgement	--	--	
Dermal	CS	Chemical Concentration in Soil	mg/kg	See Table 3	See Table 3	--	--	CDI (mg/kg-day) =
	CF1	Conversion Factor 1	kg/mg	1.00E-06	N/A	--	--	CS x SA x AF x ABS x EF x ED x CF1 x
	CF2	Conversion Factor 2	days/year	365	N/A	--	--	1/BW x 1/AT x 1/CF2
	AF	Soil to Skin Adherence Factor	mg/cm2	0.5	USEPA 1992	--	--	
	ABS	Absorption Factor	unitless	chemical-specific		--	--	
	SA	Skin Surface Area Available for Contact	cm2/day	5,000	Calculated	--	--	
	EF	Exposure Frequency	days/year	250	USEPA 1989, DTSC 1992	--	--	
	ED	Exposure Duration	years	1	Best professional judgement	--	--	
	BW	Body Weight	kg	70	USEPA 1989, DTSC 1992	--	--	
	AT-C	Averaging Time (Cancer)	years	70	USEPA 1989, DTSC 1992	--	--	
	AT-N	Averaging Time (Non-cancer)	years	1	Best professional judgement	--	--	
On- site Fugitive Dust Generation	CA	Chemical Concentration in Air	mg/m3	See Table 3	See Table 3	--	--	CDI (mg/kg-day) =
	CF2	Conversion Factor 2	days/year	365	N/A	--	--	CA x ED x EF x IRA x 1/BW x 1/AT x 1/CF2
	IRA	Inhalation Rate of Soil	m3/day	20	USEPA 1989, DTSC 1992	--	--	
	EF	Exposure Frequency	days/year	250	USEPA 1989, DTSC 1992	--	--	

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
	ED	Exposure Duration	years	1	Best professional judgement	--	--	
	BW	Body Weight	kg	70	USEPA 1989, DTSC 1992	--	--	
	AT-C	Averaging Time (Cancer)	years	70	USEPA 1989, DTSC 1992	--	--	
	AT-N	Averaging Time (Non-cancer)	years	1	Best professional judgement	--	--	
Volatilization into Ambient Air	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

References:

DTSC. 1992. "Default Exposure Parameters". Chapter 1. Supplemental Guidance for Human Health Multimedia Risk Assessment Hazardous Waste Sites and Permitted Facilities. July 1992.

USEPA. 1989. Risk Assessment Guidance for Superfund, Volume 1: Human Health Evaluation Manual (Part A) Interim Final. EPA/540/1-89/002. Office of Research and Development. Office of Emergency and Remedial Response. December 1989.

USEPA. 1991. Human Health Evaluation Manual, Supplemental Guidance: Standard Default Exposure Factors. March 25, 1991. OSWER Directive 9285.6-03.

USEPA. 1992. Dermal Exposure Assessment: Principles and Applications, Interim Report. Office of Health and Environmental Assessment. EPA 600/8-91-OHB.

Definitions:

-- = Central Tendency not considered

cm2/day = square centimeters per day

CT = Central Tendancy

days/year = days per year

kg = kilogram

kg/mg = kilograms per milligram

m3/day = cubic meters per day

m3/kg = cubic meters per kilogram

mg/cm2 = milligrams per square centimeter

mg/day = milligrams per day

mg/kg = milligrams per kilogram

N/A = Not applicable

RME = Reasonable Maximum Exposure

mg/m3 = milligrams per cubic meter

TABLE 6-32

VALUES USED FOR DAILY INTAKE CALCULATIONS

Jet Propulsion Laboratory – Operable Unit-2

Scenario Timeframe: Current
Medium: Soil
Exposure Medium: Soil
Exposure Point: Waste Pit 1/Discharge Point 1
Receptor Population: Construction Worker
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Ingestion	CS	Chemical Concentration in Soil	mg/kg	See Table 3	See Table 3	--	--	Chronic Daily Intake (CDI) (mg/kg-day) =
	IRS	Ingestion Rate of Soil	mg/day	480	USEPA 1991	--	--	CS x IRS x EF x ED x CF1 x FI x 1/BW x 1/AT x 1/CF2
	EF	Exposure Frequency	days/year	250	USEPA 1989, DTSC 1992	--	--	
	ED	Exposure Duration	years	1	Best professional judgement	--	--	
	CF1	Conversion Factor 1	kg/mg	1.00E-06	N/A	--	--	
	CF2	Conversion Factor 2	days/year	365	N/A	--	--	
	FI	Fraction Ingested from Contaminated Source	unitless	0.25	Best professional judgement	--	--	
	BW	Body Weight	kg	70	USEPA 1989, DTSC 1992	--	--	
	AT-C	Averaging Time (Cancer)	years	70	USEPA 1989, DTSC 1992	--	--	
	AT-N	Averaging Time (Non-cancer)	years	1	Best professional judgement	--	--	
Dermal	CS	Chemical Concentration in Soil	mg/kg	See Table 3	See Table 3	--	--	CDI (mg/kg-day) =
	CF1	Conversion Factor 1	kg/mg	1.00E-06	N/A	--	--	CS x SA x AF x ABS x EF x ED x CF1 x
	CF2	Conversion Factor 2	days/year	365	N/A	--	--	1/BW x 1/AT x 1/CF2
	AF	Soil to Skin Adherence Factor	mg/cm2	0.5	USEPA 1992	--	--	
	ABS	Absorption Factor	unitless	chemical-specific		--	--	
	SA	Skin Surface Area Available for Contact	cm2/day	5,000	Calculated	--	--	
	EF	Exposure Frequency	days/year	250	USEPA 1989, DTSC 1992	--	--	
	ED	Exposure Duration	years	1	Best professional judgement	--	--	
	BW	Body Weight	kg	70	USEPA 1989, DTSC 1992	--	--	
	AT-C	Averaging Time (Cancer)	years	70	USEPA 1989, DTSC 1992	--	--	
	AT-N	Averaging Time (Non-cancer)	years	1	Best professional judgement	--	--	
On- site Fugitive Dust Generation	CA	Chemical Concentration in Air	mg/m3	See Table 3	See Table 3	--	--	CDI (mg/kg-day) =
	CF2	Conversion Factor 2	days/year	365	N/A	--	--	CA x ED x EF x IRA x 1/BW x 1/AT x 1/CF2
	IRA	Inhalation Rate of Soil	m3/day	20	USEPA 1989, DTSC 1992	--	--	
	EF	Exposure Frequency	days/year	250	USEPA 1989, DTSC 1992	--	--	

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
	ED	Exposure Duration	years	1	Best professional judgement	--	--	
	BW	Body Weight	kg	70	USEPA 1989, DTSC 1992	--	--	
	AT-C	Averaging Time (Cancer)	years	70	USEPA 1989, DTSC 1992	--	--	
	AT-N	Averaging Time (Non-cancer)	years	1	Best professional judgement	--	--	
Volatilization into Ambient Air	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

References:

DTSC. 1992. "Default Exposure Parameters". Chapter 1. Supplemental Guidance for Human Health Multimedia Risk Assessment Hazardous Waste Sites and Permitted Facilities. July 1992.

USEPA. 1989. Risk Assessment Guidance for Superfund, Volume 1: Human Health Evaluation Manual (Part A) Interim Final. EPA/540/1-89/002. Office of Research and Development. Office of Emergency and Remedial Response. December 1989.

USEPA. 1991. Human Health Evaluation Manual, Supplemental Guidance: Standard Default Exposure Factors. March 25, 1991. OSWER Directive 9285.6-03.

USEPA. 1992. Dermal Exposure Assessment: Principles and Applications, Interim Report. Office of Health and Environmental Assessment. EPA 600/8-91-OHB.

Definitions:

-- = Central Tendency not considered

cm2/day = square centimeters per day

CT = Central Tendancy

days/year = days per year

kg = kilogram

kg/mg = kilograms per milligram

m3/day = cubic meters per day

m3/kg = cubic meters per kilogram

mg/cm2 = milligrams per square centimeter

mg/day = milligrams per day

mg/kg = milligrams per kilogram

N/A = Not applicable

RME = Reasonable Maximum Exposure

mg/m3 = milligrams per cubic meter

TABLE 6-33

VALUES USED FOR DAILY INTAKE CALCULATIONS

Jet Propulsion Laboratory – Operable Unit-2

Scenario Timeframe: Current
Medium: Soil
Exposure Medium: Soil
Exposure Point: Waste Pit 4
Receptor Population: Construction Worker
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Ingestion	CS	Chemical Concentration in Soil	mg/kg	See Table 3	See Table 3	--	--	Chronic Daily Intake (CDI) (mg/kg-day) =
	IRS	Ingestion Rate of Soil	mg/day	480	USEPA 1991	--	--	CS x IRS x EF x ED x CF1 x FI x 1/BW x 1/AT x 1/CF2
	EF	Exposure Frequency	days/year	250	USEPA 1989, DTSC 1992	--	--	
	ED	Exposure Duration	years	1	Best professional judgement	--	--	
	CF1	Conversion Factor 1	kg/mg	1.00E-06	N/A	--	--	
	CF2	Conversion Factor 2	days/year	365	N/A	--	--	
	FI	Fraction Ingested from Contaminated Source	unitless	0.25	Best professional judgement	--	--	
	BW	Body Weight	kg	70	USEPA 1989, DTSC 1992	--	--	
	AT-C	Averaging Time (Cancer)	years	70	USEPA 1989, DTSC 1992	--	--	
	AT-N	Averaging Time (Non-cancer)	years	1	Best professional judgement	--	--	
Dermal	CS	Chemical Concentration in Soil	mg/kg	See Table 3	See Table 3	--	--	CDI (mg/kg-day) =
	CF1	Conversion Factor 1	kg/mg	1.00E-06	N/A	--	--	CS x SA x AF x ABS x EF x ED x CF1 x
	CF2	Conversion Factor 2	days/year	365	N/A	--	--	1/BW x 1/AT x 1/CF2
	AF	Soil to Skin Adherence Factor	mg/cm2	0.5	USEPA 1992	--	--	
	ABS	Absorption Factor	unitless	chemical-specific		--	--	
	SA	Skin Surface Area Available for Contact	cm2/day	5,000	Calculated	--	--	
	EF	Exposure Frequency	days/year	250	USEPA 1989, DTSC 1992	--	--	
	ED	Exposure Duration	years	1	Best professional judgement	--	--	
	BW	Body Weight	kg	70	USEPA 1989, DTSC 1992	--	--	
	AT-C	Averaging Time (Cancer)	years	70	USEPA 1989, DTSC 1992	--	--	
	AT-N	Averaging Time (Non-cancer)	years	1	Best professional judgement	--	--	
On- site Fugitive Dust Generation	CA	Chemical Concentration in Air	mg/m3	See Table 3	See Table 3	--	--	CDI (mg/kg-day) =
	CF2	Conversion Factor 2	days/year	365	N/A	--	--	CA x ED x EF x IRA x 1/BW x 1/AT x 1/CF2
	IRA	Inhalation Rate of Soil	m3/day	20	USEPA 1989, DTSC 1992	--	--	
	EF	Exposure Frequency	days/year	250	USEPA 1989, DTSC 1992	--	--	

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
	ED	Exposure Duration	years	1	Best professional judgement	--	--	
	BW	Body Weight	kg	70	USEPA 1989, DTSC 1992	--	--	
	AT-C	Averaging Time (Cancer)	years	70	USEPA 1989, DTSC 1992	--	--	
	AT-N	Averaging Time (Non-cancer)	years	1	Best professional judgement	--	--	
Volatilization into Ambient Air	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

References:

DTSC. 1992. "Default Exposure Parameters". Chapter 1. Supplemental Guidance for Human Health Multimedia Risk Assessment Hazardous Waste Sites and Permitted Facilities. July 1992.

USEPA. 1989. Risk Assessment Guidance for Superfund, Volume 1: Human Health Evaluation Manual (Part A) Interim Final. EPA/540/1-89/002. Office of Research and Development. Office of Emergency and Remedial Response. December 1989.

USEPA. 1991. Human Health Evaluation Manual, Supplemental Guidance: Standard Default Exposure Factors. March 25, 1991. OSWER Directive 9285.6-03.

USEPA. 1992. Dermal Exposure Assessment: Principles and Applications, Interim Report. Office of Health and Environmental Assessment. EPA 600/8-91-OHB.

Definitions:

-- = Central Tendency not considered

cm2/day = square centimeters per day

CT = Central Tendancy

days/year = days per year

kg = kilogram

kg/mg = kilograms per milligram

m3/day = cubic meters per day

m3/kg = cubic meters per kilogram

mg/cm2 = milligrams per square centimeter

mg/day = milligrams per day

mg/kg = milligrams per kilogram

N/A = Not applicable

RME = Reasonable Maximum Exposure

mg/m3 = milligrams per cubic meter

TABLE 6-34

VALUES USED FOR DAILY INTAKE CALCULATIONS

Jet Propulsion Laboratory – Operable Unit-2

Scenario Timeframe: Current
Medium: Soil
Exposure Medium: Soil
Exposure Point: Discharge Point 2
Receptor Population: Commercial Worker
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Ingestion	CS	Chemical Concentration in Soil	mg/kg	See Table 3	See Table 3	--	--	Chronic Daily Intake (CDI) (mg/kg-day) =
	IRS	Ingestion Rate of Soil	mg/day	50	USEPA 1989, DTSC 1992	--	--	CS x IRS x EF x ED x CF1 x FI x 1/BW x 1/AT x 1/CF2
	EF	Exposure Frequency	days/year	250	USEPA 1989, DTSC 1992	--	--	
	ED	Exposure Duration	years	25	USEPA 1989, DTSC 1992	--	--	
	CF1	Conversion Factor 1	kg/mg	1.00E-06	--	--	--	
	CF2	Conversion Factor 2	days/year	365	--			
	FI	Fraction Ingested from Contaminated Source	unitless	0.25	Best professional judgement	--	--	
	BW	Body Weight	kg	70	USEPA 1989, DTSC 1992	--	--	
	AT-C	Averaging Time (Cancer)	years	70	USEPA 1989, DTSC 1992	--	--	
	AT-N	Averaging Time (Non-cancer)	years	25	USEPA 1989, DTSC 1992	--	--	
Dermal	CS	Chemical Concentration in Soil	mg/kg	See Table 3	See Table 3	--	--	CDI (mg/kg-day) =
	CF1	Conversion Factor 1	kg/mg	1.00E-06	--	--	--	CS x SA x AF x ABS x EF x ED x CF1 x
	CF2	Conversion Factor 2	days/year	365	--	--	--	1/BW x 1/AT x 1/CF2
	AF	Soil to Skin Adherence Factor	mg/cm2	0.5	USEPA 1992	--	--	
	ABS	Absorption Factor	unitless	chemical-specific		--	--	
	SA	Skin Surface Available for Contact	cm2/day	5,000	Calculated	--	--	
	EF	Exposure Frequency	days/year	250	USEPA 1989, DTSC 1992	--	--	
	ED	Exposure Duration	years	25	USEPA 1989, DTSC 1992	--	--	
	BW	Body Weight	kg	70	USEPA 1989, DTSC 1992	--	--	
	AT-C	Averaging Time (Cancer)	years	70	USEPA 1989, DTSC 1992	--	--	
	AT-N	Averaging Time (Non-cancer)	years	25	USEPA 1989, DTSC 1992	--	--	
On- site Fugitive Dust Generation	CA	Chemical Concentration in Air	mg/m3	See Table 3	See Table 3	--	--	CDI (mg/kg-day) =
	CF2	Conversion Factor 2	days/year	365	--	--	--	CA x ED x EF x IRA x 1/BW x 1/AT x 1/CF2
	IRA	Inhalation Rate of Soil	m3/day	20	USEPA 1989, DTSC 1992	--	--	
	EF	Exposure Frequency	days/year	250	USEPA 1989, DTSC 1992	--	--	
	ED	Exposure Duration	years	25	USEPA 1989, DTSC 1992	--	--	
	BW	Body Weight	kg	70	USEPA 1989, DTSC 1992	--	--	

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
	AT-C	Averaging Time (Cancer)	years	70	USEPA 1989, DTSC 1992	--	--	
	AT-N	Averaging Time (Non-cancer)	years	25	USEPA 1989, DTSC 1992	--	--	
Volatilization into Ambient Air	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

References:

DTSC. 1992. "Default Exposure Parameters". Chapter 1. Supplemental Guidance for Human Health Multimedia Risk Assessment Hazardous Waste Sites and Permitted Facilities. July 1992.

USEPA. 1989. Risk Assessment Guidance for Superfund, Volume 1: Human Health Evaluation Manual (Part A) Interim Final. EPA/540/1-89/002. Office of Research and Development. Office of Emergency and Remedial Response. December 1989.

USEPA. 1992. Dermal Exposure Assessment: Principles and Applications, Interim Report. Office of Health and Environmental Assessment. EPA 600/8-91-OHB.

Definitions:

-- = Central Tendency not considered

cm2/day = square centimeters per day

CT = Central Tendancy

days/year = days per year

kg = kilogram

kg/mg = kilograms per milligram

m3/day = cubic meters per day

m3/kg = cubic meters per kilogram

mg/cm2 = milligrams per square centimeter

mg/day = milligrams per day

mg/kg = milligrams per kilogram

N/A = Not applicable

RME = Reasonable Maximum Exposure

mg/m3 = milligrams per cubic meter

TABLE 6-35

VALUES USED FOR DAILY INTAKE CALCULATIONS

Jet Propulsion Laboratory – Operable Unit-2

Scenario Timeframe: Current
Medium: Soil
Exposure Medium: Soil
Exposure Point: Discharge Point 3
Receptor Population: Commercial Worker
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Ingestion	CS	Chemical Concentration in Soil	mg/kg	See Table 3	See Table 3	–	–	Chronic Daily Intake (CDI) (mg/kg-day) =
	IRS	Ingestion Rate of Soil	mg/day	50	USEPA 1989, DTSC 1992	–	–	CS x IRS x EF x ED x CF1 x FI x 1/BW x 1/AT x 1/CF2
	EF	Exposure Frequency	days/year	250	USEPA 1989, DTSC 1992	–	–	
	ED	Exposure Duration	years	25	USEPA 1989, DTSC 1992	–	–	
	CF1	Conversion Factor 1	kg/mg	1.00E-06	–	–	–	
	CF2	Conversion Factor 2	days/year	365	–			
	FI	Fraction Ingested from Contaminated Source	unitless	0.25	Best professional judgement	–	–	
	BW	Body Weight	kg	70	USEPA 1989, DTSC 1992	–	–	
	AT-C	Averaging Time (Cancer)	years	70	USEPA 1989, DTSC 1992	–	–	
	AT-N	Averaging Time (Non-cancer)	years	25	USEPA 1989, DTSC 1992	–	–	
Dermal	CS	Chemical Concentration in Soil	mg/kg	See Table 3	See Table 3	–	–	CDI (mg/kg-day) =
	CF1	Conversion Factor 1	kg/mg	1.00E-06	–	–	–	CS x SA x AF x ABS x EF x ED x CF1 x
	CF2	Conversion Factor 2	days/year	365	–	–	–	1/BW x 1/AT x 1/CF2
	AF	Soil to Skin Adherence Factor	mg/cm2	0.5	USEPA 1992	–	–	
	ABS	Absorption Factor	unitless	chemical-specific		–	–	
	SA	Skin Surface Available for Contact	cm2/day	5,000	Calculated	–	–	
	EF	Exposure Frequency	days/year	250	USEPA 1989, DTSC 1992	–	–	
	ED	Exposure Duration	years	25	USEPA 1989, DTSC 1992	–	–	
	BW	Body Weight	kg	70	USEPA 1989, DTSC 1992	–	–	
	AT-C	Averaging Time (Cancer)	years	70	USEPA 1989, DTSC 1992	–	–	
	AT-N	Averaging Time (Non-cancer)	years	25	USEPA 1989, DTSC 1992	–	–	
On- site Fugitive	CA	Chemical Concentration in Air	mg/m3	See Table 3	See Table 3	–	–	CDI (mg/kg-day) =
Dust Generation	CF2	Conversion Factor 2	days/year	365	–	–	–	CA x ED x EF x IRA x 1/BW x 1/AT x 1/CF2
	IRA	Inhalation Rate of Soil	m3/day	20	USEPA 1989, DTSC 1992	–	–	
	EF	Exposure Frequency	days/year	250	USEPA 1989, DTSC 1992	–	–	
	ED	Exposure Duration	years	25	USEPA 1989, DTSC 1992	–	–	
	BW	Body Weight	kg	70	USEPA 1989, DTSC 1992	–	–	

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
	AT-C	Averaging Time (Cancer)	years	70	USEPA 1989, DTSC 1992	--	--	
	AT-N	Averaging Time (Non-cancer)	years	25	USEPA 1989, DTSC 1992	--	--	
Volatilization into Ambient Air	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

References:

DTSC. 1992. "Default Exposure Parameters". Chapter 1. Supplemental Guidance for Human Health Multimedia Risk Assessment Hazardous Waste Sites and Permitted Facilities. July 1992.

USEPA. 1989. Risk Assessment Guidance for Superfund, Volume 1: Human Health Evaluation Manual (Part A) Interim Final. EPA/540/1-89/002. Office of Research and Development. Office of Emergency and Remedial Response. December 1989.

USEPA. 1992. Dermal Exposure Assessment: Principles and Applications, Interim Report. Office of Health and Environmental Assessment. EPA 600/8-91-OHB.

Definitions:

-- = Central Tendency not considered

cm2/day = square centimeters per day

CT = Central Tendancy

days/year = days per year

kg = kilogram

kg/mg = kilograms per milligram

m3/day = cubic meters per day

m3/kg = cubic meters per kilogram

mg/cm2 = milligrams per square centimeter

mg/day = milligrams per day

mg/kg = milligrams per kilogram

N/A = Not applicable

RME = Reasonable Maximum Exposure

mg/m3 = milligrams per cubic meter

TABLE 6-36

VALUES USED FOR DAILY INTAKE CALCULATIONS

Jet Propulsion Laboratory -- Operable Unit-2

Scenario Timeframe: Current
Medium: Soil
Exposure Medium: Soil
Exposure Point: Discharge Point 4
Receptor Population: Commercial Worker
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Ingestion	CS	Chemical Concentration in Soil	mg/kg	See Table 3	See Table 3	--	--	Chronic Daily Intake (CDI) (mg/kg-day) =
	IRS	Ingestion Rate of Soil	mg/day	50	USEPA 1989, DTSC 1992	--	--	CS x IRS x EF x ED x CF1 x FI x 1/BW x 1/AT x 1/CF2
	EF	Exposure Frequency	days/year	250	USEPA 1989, DTSC 1992	--	--	
	ED	Exposure Duration	years	25	USEPA 1989, DTSC 1992	--	--	
	CF1	Conversion Factor 1	kg/mg	1.00E-06	--	--	--	
	CF2	Conversion Factor 2	days/year	365	--			
	FI	Fraction Ingested from Contaminated Source	unitless	0.25	Best professional judgement	--	--	
	BW	Body Weight	kg	70	USEPA 1989, DTSC 1992	--	--	
	AT-C	Averaging Time (Cancer)	years	70	USEPA 1989, DTSC 1992	--	--	
	AT-N	Averaging Time (Non-cancer)	years	25	USEPA 1989, DTSC 1992	--	--	
Dermal	CS	Chemical Concentration in Soil	mg/kg	See Table 3	See Table 3	--	--	CDI (mg/kg-day) =
	CF1	Conversion Factor 1	kg/mg	1.00E-06	--	--	--	CS x SA x AF x ABS x EF x ED x CF1 x
	CF2	Conversion Factor 2	days/year	365	--	--	--	1/BW x 1/AT x 1/CF2
	AF	Soil to Skin Adherence Factor	mg/cm2	0.5	USEPA 1992	--	--	
	ABS	Absorption Factor	unitless	chemical-specific		--	--	
	SA	Skin Surface Available for Contact	cm2/day	5,000	Calculated	--	--	
	EF	Exposure Frequency	days/year	250	USEPA 1989, DTSC 1992	--	--	
	ED	Exposure Duration	years	25	USEPA 1989, DTSC 1992	--	--	
	BW	Body Weight	kg	70	USEPA 1989, DTSC 1992	--	--	
	AT-C	Averaging Time (Cancer)	years	70	USEPA 1989, DTSC 1992	--	--	
	AT-N	Averaging Time (Non-cancer)	years	25	USEPA 1989, DTSC 1992	--	--	
On- site Fugitive	CA	Chemical Concentration in Air	mg/m3	See Table 3	See Table 3	--	--	CDI (mg/kg-day) =
Dust Generation	CF2	Conversion Factor 2	days/year	365	--	--	--	CA x ED x EF x IRA x 1/BW x 1/AT x 1/CF2
	IRA	Inhalation Rate of Soil	m3/day	20	USEPA 1989, DTSC 1992	--	--	
	EF	Exposure Frequency	days/year	250	USEPA 1989, DTSC 1992	--	--	
	ED	Exposure Duration	years	25	USEPA 1989, DTSC 1992	--	--	
	BW	Body Weight	kg	70	USEPA 1989, DTSC 1992	--	--	

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
	AT-C	Averaging Time (Cancer)	years	70	USEPA 1989, DTSC 1992	--	--	
	AT-N	Averaging Time (Non-cancer)	years	25	USEPA 1989, DTSC 1992	--	--	
Volatilization into Ambient Air	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

References:

DTSC. 1992. "Default Exposure Parameters". Chapter 1. Supplemental Guidance for Human Health Multimedia Risk Assessment Hazardous Waste Sites and Permitted Facilities. July 1992.

USEPA. 1989. Risk Assessment Guidance for Superfund, Volume 1: Human Health Evaluation Manual (Part A) Interim Final. EPA/540/1-89/002. Office of Research and Development. Office of Emergency and Remedial Response. December 1989.

USEPA. 1992. Dermal Exposure Assessment: Principles and Applications, Interim Report. Office of Health and Environmental Assessment. EPA 600/8-91-OHB.

Definitions:

-- = Central Tendency not considered

cm2/day = square centimeters per day

CT = Central Tendancy

days/year = days per year

kg = kilogram

kg/mg = kilograms per milligram

m3/day = cubic meters per day

m3/kg = cubic meters per kilogram

mg/cm2 = milligrams per square centimeter

mg/day = milligrams per day

mg/kg = milligrams per kilogram

N/A = Not applicable

RME = Reasonable Maximum Exposure

mg/m3 = milligrams per cubic meter

TABLE 6-37

VALUES USED FOR DAILY INTAKE CALCULATIONS

Jet Propulsion Laboratory – Operable Unit-2

Scenario Timeframe: Current
Medium: Soil
Exposure Medium: Soil
Exposure Point: Waste Pit 1/Discharge Point1
Receptor Population: Commercial Worker
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Ingestion	CS	Chemical Concentration in Soil	mg/kg	See Table 3	See Table 3	--	--	Chronic Daily Intake (CDI) (mg/kg-day) =
	IRS	Ingestion Rate of Soil	mg/day	50	USEPA 1989, DTSC 1992	--	--	CS x IRS x EF x ED x CF1 x FI x 1/BW x 1/AT x 1/CF2
	EF	Exposure Frequency	days/year	250	USEPA 1989, DTSC 1992	--	--	
	ED	Exposure Duration	years	25	USEPA 1989, DTSC 1992	--	--	
	CF1	Conversion Factor 1	kg/mg	1.00E-06	--	--	--	
	CF2	Conversion Factor 2	days/year	365	--			
	FI	Fraction Ingested from Contaminated Source	unitless	0.25	Best professional judgement	--	--	
	BW	Body Weight	kg	70	USEPA 1989, DTSC 1992	--	--	
	AT-C	Averaging Time (Cancer)	years	70	USEPA 1989, DTSC 1992	--	--	
	AT-N	Averaging Time (Non-cancer)	years	25	USEPA 1989, DTSC 1992	--	--	
Dermal	CS	Chemical Concentration in Soil	mg/kg	See Table 3	See Table 3	--	--	CDI (mg/kg-day) =
	CF1	Conversion Factor 1	kg/mg	1.00E-06	--	--	--	CS x SA x AF x ABS x EF x ED x CF1 x
	CF2	Conversion Factor 2	days/year	365	--	--	--	1/BW x 1/AT x 1/CF2
	AF	Soil to Skin Adherence Factor	mg/cm2	0.5	USEPA 1992	--	--	
	ABS	Absorption Factor	unitless	chemical-specific		--	--	
	SA	Skin Surface Available for Contact	cm2/day	5,000	Calculated	--	--	
	EF	Exposure Frequency	days/year	250	USEPA 1989, DTSC 1992	--	--	
	ED	Exposure Duration	years	25	USEPA 1989, DTSC 1992	--	--	
	BW	Body Weight	kg	70	USEPA 1989, DTSC 1992	--	--	
	AT-C	Averaging Time (Cancer)	years	70	USEPA 1989, DTSC 1992	--	--	
	AT-N	Averaging Time (Non-cancer)	years	25	USEPA 1989, DTSC 1992	--	--	
On- site Fugitive Dust Generation	CA	Chemical Concentration in Air	mg/m3	See Table 3	See Table 3	--	--	CDI (mg/kg-day) =
	CF2	Conversion Factor 2	days/year	365	--	--	--	CA x ED x EF x IRA x 1/BW x 1/AT x 1/CF2
	IRA	Inhalation Rate of Soil	m3/day	20	USEPA 1989, DTSC 1992	--	--	
	EF	Exposure Frequency	days/year	250	USEPA 1989, DTSC 1992	--	--	
	ED	Exposure Duration	years	25	USEPA 1989, DTSC 1992	--	--	
	BW	Body Weight	kg	70	USEPA 1989, DTSC 1992	--	--	

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
	AT-C	Averaging Time (Cancer)	years	70	USEPA 1989, DTSC 1992	–	–	
	AT-N	Averaging Time (Non-cancer)	years	25	USEPA 1989, DTSC 1992	–	–	
Volatilization into Ambient Air	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

References:

DTSC. 1992. "Default Exposure Parameters". Chapter 1. Supplemental Guidance for Human Health Multimedia Risk Assessment Hazardous Waste Sites and Permitted Facilities. July 1992.

USEPA. 1989. Risk Assessment Guidance for Superfund, Volume 1: Human Health Evaluation Manual (Part A) Interim Final. EPA/540/1-89/002. Office of Research and Development. Office of Emergency and Remedial Response. December 1989.

USEPA. 1992. Dermal Exposure Assessment: Principles and Applications, Interim Report. Office of Health and Environmental Assessment. EPA 600/8-91-OHB.

Definitions:

– = Central Tendency not considered
cm2/day = square centimeters per day
CT = Central Tendancy
days/year = days per year
kg = kilogram
kg/mg = kilograms per milligram
m3/day = cubic meters per day
m3/kg = cubic meters per kilogram
mg/cm2 = milligrams per square centimeter
mg/day = milligrams per day
mg/kg = milligrams per kilogram
N/A = Not applicable
RME = Reasonable Maximum Exposure
mg/m3 = milligrams per cubic meter

TABLE 6-38

VALUES USED FOR DAILY INTAKE CALCULATIONS

Jet Propulsion Laboratory -- Operable Unit-2

Scenario Timeframe: Current
Medium: Soil
Exposure Medium: Soil
Exposure Point: Waste Pit 4
Receptor Population: Commercial Worker
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Ingestion	CS	Chemical Concentration in Soil	mg/kg	See Table 3	See Table 3	--	--	Chronic Daily Intake (CDI) (mg/kg-day) =
	IRS	Ingestion Rate of Soil	mg/day	50	USEPA 1989, DTSC 1992	--	--	CS x IRS x EF x ED x CF1 x FI x 1/BW x 1/AT x 1/CF2
	EF	Exposure Frequency	days/year	250	USEPA 1989, DTSC 1992	--	--	
	ED	Exposure Duration	years	25	USEPA 1989, DTSC 1992	--	--	
	CF1	Conversion Factor 1	kg/mg	1.00E-06	--	--	--	
	CF2	Conversion Factor 2	days/year	365	--			
	FI	Fraction Ingested from Contaminated Source	unitless	0.25	Best professional judgement	--	--	
	BW	Body Weight	kg	70	USEPA 1989, DTSC 1992	--	--	
	AT-C	Averaging Time (Cancer)	years	70	USEPA 1989, DTSC 1992	--	--	
	AT-N	Averaging Time (Non-cancer)	years	25	USEPA 1989, DTSC 1992	--	--	
Dermal	CS	Chemical Concentration in Soil	mg/kg	See Table 3	See Table 3	--	--	CDI (mg/kg-day) =
	CF1	Conversion Factor 1	kg/mg	1.00E-06	--	--	--	CS x SA x AF x ABS x EF x ED x CF1 x
	CF2	Conversion Factor 2	days/year	365	--	--	--	1/BW x 1/AT x 1/CF2
	AF	Soil to Skin Adherence Factor	mg/cm2	0.5	USEPA 1992	--	--	
	ABS	Absorption Factor	unitless	chemical-specific		--	--	
	SA	Skin Surface Available for Contact	cm2/day	5,000	Calculated	--	--	
	EF	Exposure Frequency	days/year	250	USEPA 1989, DTSC 1992	--	--	
	ED	Exposure Duration	years	25	USEPA 1989, DTSC 1992	--	--	
	BW	Body Weight	kg	70	USEPA 1989, DTSC 1992	--	--	
	AT-C	Averaging Time (Cancer)	years	70	USEPA 1989, DTSC 1992	--	--	
	AT-N	Averaging Time (Non-cancer)	years	25	USEPA 1989, DTSC 1992	--	--	
On- site Fugitive Dust Generation	CA	Chemical Concentration in Air	mg/m3	See Table 3	See Table 3	--	--	CDI (mg/kg-day) =
	CF2	Conversion Factor 2	days/year	365	--	--	--	CA x ED x EF x IRA x 1/BW x 1/AT x 1/CF2
	IRA	Inhalation Rate of Soil	m3/day	20	USEPA 1989, DTSC 1992	--	--	
	EF	Exposure Frequency	days/year	250	USEPA 1989, DTSC 1992	--	--	
	ED	Exposure Duration	years	25	USEPA 1989, DTSC 1992	--	--	
	BW	Body Weight	kg	70	USEPA 1989, DTSC 1992	--	--	

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
	AT-C	Averaging Time (Cancer)	years	70	USEPA 1989, DTSC 1992	--	--	
	AT-N	Averaging Time (Non-cancer)	years	25	USEPA 1989, DTSC 1992	--	--	
Volatilization into Ambient Air	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

References:

DTSC. 1992. "Default Exposure Parameters". Chapter 1. Supplemental Guidance for Human Health Multimedia Risk Assessment Hazardous Waste Sites and Permitted Facilities. July 1992.

USEPA. 1989. Risk Assessment Guidance for Superfund, Volume 1: Human Health Evaluation Manual (Part A) Interim Final. EPA/540/1-89/002. Office of Research and Development. Office of Emergency and Remedial Response. December 1989.

USEPA. 1992. Dermal Exposure Assessment: Principles and Applications, Interim Report. Office of Health and Environmental Assessment. EPA 600/8-91-OHB.

Definitions:

-- = Central Tendency not considered
cm2/day = square centimeters per day
CT = Central Tendancy
days/year = days per year
kg = kilogram
kg/mg = kilograms per milligram
m3/day = cubic meters per day
m3/kg = cubic meters per kilogram
mg/cm2 = milligrams per square centimeter
mg/day = milligrams per day
mg/kg = milligrams per kilogram
N/A = Not applicable
RME = Reasonable Maximum Exposure
mg/m3 = milligrams per cubic meter

TABLE 6-39

NON-CANCER TOXICITY DATA – ORAL/DERMAL

Jet Propulsion Laboratory -- Operable Unit-2

Chemical of Potential Concern	Chronic/ Subchronic	Oral RfD Value	Oral RfD Units	Oral to Dermal Adjustment Factor (1)	Adjusted Dermal RfD (2)	Units	Primary Target Organ	Combined Uncertainty/Modifying Factors	Sources of RfD: Target Organ	Dates of RfD: Target Organ (MM/DD/YY)
Arochlor-1254	Chronic	2.0E-05	mg/kg-day	N/A	2.0E-05	mg/kg-day	eyes	300	IRIS	11/09/98
	Subchronic	5.0E-05	mg/kg-day	N/A	5.0E-05	mg/kg-day	eyes	100	HEAST	1997
Arochlor-1260	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	11/09/98
Arsenic	Chronic	3E-04	mg/kg-day	N/A	3.0E-04	mg/kg-day	skin	3	IRIS	11/09/98
	Subchronic	3E-04	mg/kg-day	N/A	3.0E-04	mg/kg-day	skin	3	HEAST	1997
Chromium (VI)	Chronic	3E-03	mg/kg-day	0.2	6.0E-04	mg/kg-day	none reported	300	IRIS	11/09/98
	Subchronic	2E-02	mg/kg-day	0.2	4.0E-03	mg/kg-day	none reported	100	HEAST	1997

(1) USEPA. 1995. Supplemental Guidance to RAGS: Region 4 Bulletins. Human Health Risk Assessment Bulletin No. 1.

(2) Adjusted dermal RfD = oral RfD x oral to dermal adjustment factor

Definitions:

N/A = Not applicable

RfD = reference dose

mg/kg-day = milligrams per kilogram per day

IRIS = Integrated Risk Information System

MM/DD/YY = month/day/year

HEAST = Health Effects Assessment Summary Tables

TABLE 6-40

NON-CANCER TOXICITY DATA -- INHALATION

Jet Propulsion Laboratory -- Operable Unit-2

Chemical of Potential Concern	Chronic/ Subchronic	Value Inhalation RfC	Units	Adjusted Inhalation RfD	Units	Primary Target Organ	Combined Uncertainty/Modifying Factors	Sources of RfC:RfD: Target Organ	Dates (MM/DD/YY)
Arochlor-1254	Chronic	N/A	N/A	2.0E-05	mg/kg/day	eyes	N/P	USEPA	11/09/98
	Subchronic	N/A	N/A	2.0E-05	mg/kg/day	eyes	N/P	HEAST	1997
Arochlor-1260	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	11/09/98
Arsenic	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	11/09/98
Chromium (VI)	Chronic	N/A	N/A	2.3E-06	mg/kg/day	lung	90	IRIS	11/09/98
	Subchronic	N/A	N/A	2.0E-06	mg/kg/day	lung	90	HEAST	1997

Definitions:

N/A = Not applicable

N/P = Not provided

RfC = reference concentration

RfD = reference dose

mg/kg-day = milligrams per kilogram per day

IRIS = Integrated Risk Information System

MM/DD/YY = month/day/year

HEAST = Health Effects Assessment Summary Tables

TABLE 6-41

CANCER TOXICITY DATA – ORAL/DERMAL

Jet Propulsion Laboratory – Operable Unit-2

Chemical of Potential Concern	Oral Cancer Slope Factor	Oral to Dermal Adjustment Factor	Adjusted Dermal Cancer Slope Factor (1)	Units	Weight of Evidence/ Cancer Guideline Description	Source	Date (2) (MM/DD/YY)
Arochlor-1254	2.0	N/A	2.0	(mg/kg-day) -1	B2	CAOEHHA	11/94
Arochlor-1260	2.0	N/A	2.0	(mg/kg-day) -1	B2	CAOEHHA	11/94
Arsenic	1.5	N/A	1.5	(mg/kg-day) -1	A	CAOEHHA	11/94
Chromium (VI)	0.42	0.2	2.1	(mg/kg-day) -1	A	CAOEHHA	11/94

Definitions:

mg/kg-day = milligrams per kilogram per day

MM/DD/YY = month/day/year

CAOEHHA = California Office of Environmental Health Hazard Assessment

(1) Adjusted dermal cancer slope factor = oral cancer slope factor/oral to dermal adjustement factor.

EPA Group:

A - Human carcinogen

B1 - Probable human carcinogen - indicates that limited human data are available

B2 - Probable human carcinogen - indicates sufficient evidence in animals and inadequate or no evidence in humans

C - Possible human carcinogen

D - Not classifiable as a human carcinogen

E - Evidence of noncarcinogenicity

TABLE 6-42

CANCER TOXICITY DATA -- INHALATION

Jet Propulsion Laboratory -- Operable Unit-2

Chemical of Potential Concern	Unit Risk	Units	Adjustment	Inhalation Cancer Slope Factor	Units	Weight of Evidence/ Cancer Guideline Description	Source	Date (1) (MM/DD/YY)
Arochlor-1254	0.00057	ug/m3		2.0	mg/kg-day -1	B2	CAOEHHA	11/94
Arochlor-1260	0.00057	ug/m3		2.0	mg/kg-day -1	B2	CAOEHHA	11/94
Arsenic	0.0033	ug/m3		12	mg/kg-day -1	A	CAOEHHA	11/94
Chromium (VI)	0.15	ug/m3		510	mg/kg-day -1	A	CAOEHHA	11/94

Definitions:

mg/kg-day = milligrams per kilogram per day

MM/DD/YY = month/day/year

ug/m3 = micrograms per cubic meter

CAOEHHA = California Office of Environmental Health Hazard Assessment

EPA Group:

A - Human carcinogen

B1 - Probable human carcinogen - indicates that limited human data are available

B2 - Probable human carcinogen - indicates sufficient evidence in animals and inadequate or no evidence in humans

C - Possible human carcinogen

D - Not classifiable as a human carcinogen

E - Evidence of noncarcinogenicity

TABLE 6-43
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
Jet Propulsion Laboratory -- Operable Unit-2

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Soil
Exposure Point: Discharge Point 2
Receptor Population: On-site Resident
Receptor Age: Child/Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Chromium (VI)	0.28	mg/kg	0.28	mg/kg	M	3.6E-06	mg/kg-day	3.0E-03	mg/kg-day	N/A	N/A	0.0012
	(Total)												0.0012
Dermal	Chromium (VI) (a)	0.28	mg/kg	0.28	mg/kg	M	0.0E+00	mg/kg-day	6.0E-04	mg/kg-day	N/A	N/A	0.0
	(Total)												0.0
Inhalation	Chromium (VI)	0.28	mg/kg	0.28	mg/kg	M	8.9E-09	mg/kg-day	2.3E-06	mg/kg-day	N/A	N/A	0.0039
	(Total)												0.0039
												Total Hazard Index Across All Exposure Routes/Pathways	0.0051

Notes: (a)Chromium (VI) is assumed to have 0% dermal absorption

Definitions: RME = reasonable maximum exposure
EPC = exposure point concentration
mg/kg = milligrams per kilogram
mg/kg-day = milligram per kilogram per day
N/A = Not applicable
M = Medium-specific EPC selected for hazard calculation.

TABLE 6-44
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
Jet Propulsion Laboratory -- Operable Unit-2

Scenario Timeframe: Current
Medium: Soil
Exposure Medium: Soil
Exposure Point: Discharge Point 2
Receptor Population: Construction Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Chromium (VI)	0.28	mg/kg	0.28	mg/kg	M	3.3E-07	mg/kg-day	2.0E-02	mg/kg-day	N/A	N/A	0.000016
	(Total)												0.000016
Dermal	Chromium (VI) (a)	0.28	mg/kg	0.28	mg/kg	M	0.0E+00	mg/kg-day	4.0E-03	mg/kg-day	N/A	N/A	0.0
	(Total)												0.0
Inhalation	Chromium (VI)	0.28	mg/kg	0.28	mg/kg	M	2.7E-09	mg/kg-day	2.3E-06	mg/kg-day	N/A	N/A	0.0012
	(Total)												0.0012
												Total Hazard Index Across All Exposure Routes/Pathways	0.0012

Notes: (a)Chromium (VI) is assumed to have 0% dermal absorption

Definitions: RME = reasonable maximum exposure
EPC = exposure point concentration
mg/kg = milligrams per kilogram
mg/kg-day = milligram per kilogram per day
N/A = Not applicable
M = Medium-specific EPC selected for hazard calculation.

TABLE 6-45
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
Jet Propulsion Laboratory -- Operable Unit-2

Scenario Timeframe: Current
Medium: Soil
Exposure Medium: Soil
Exposure Point: Discharge Point 2
Receptor Population: Commercial Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Chromium (VI)	0.28	mg/kg	0.28	mg/kg	M	3.4E-08	mg/kg-day	3.0E-03	mg/kg-day	N/A	N/A	0.000011
	(Total)												0.000011
Dermal	Chromium (VI) (a)	0.28	mg/kg	0.28	mg/kg	M	0.0E+00	mg/kg-day	6.0E-04	mg/kg-day	N/A	N/A	0.0
	(Total)												0.0
Inhalation	Chromium (VI)	0.28	mg/kg	0.28	mg/kg	M	2.7E-09	mg/kg-day	2.3E-06	mg/kg-day	N/A	N/A	0.0012
	(Total)												0.0012
												Total Hazard Index Across All Exposure Routes/Pathways	0.0012

Notes: (a)Chromium (VI) is assumed to have 0% dermal absorption

Definitions: RME = reasonable maximum exposure
EPC = exposure point concentration
mg/kg = milligrams per kilogram
mg/kg-day = milligram per kilogram per day
N/A = Not applicable
M = Medium-specific EPC selected for hazard calculation.

TABLE 6-46
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
Jet Propulsion Laboratory -- Operable Unit-2

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Soil
Exposure Point: Discharge Point 3
Receptor Population: On-site Resident
Receptor Age: Child/Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Arsenic (Total)	4.5	mg/kg	4.5	mg/kg	M	5.8E-05	mg/kg-day	3.0E-04	mg/kg-day	N/A	N/A	1.9E-01
													1.9E-01
Dermal	Arsenic (Total)	4.5	mg/kg	4.5	mg/kg	M	1.7E-05	mg/kg-day	3.0E-04	mg/kg-day	N/A	N/A	5.8E-02
													5.8E-02
Inhalation	Arsenic (Total)	4.5	mg/kg	4.5	mg/kg	M	1.4E-07	mg/kg-day	N/A	mg/kg-day	N/A	N/A	
												Total Hazard Index Across All Exposure Routes/Pathways	2.5E-01

Definitions: RME = Reasonable Maximum Exposure
EPC = Exposure Point Concentration
mg/kg = milligrams per kilogram
mg/kg-day = milligram per kilogram per day
N/A = Not applicable
M = Medium-specific EPC selected for hazard calculation.

TABLE 6-47
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
Jet Propulsion Laboratory -- Operable Unit-2

Scenario Timeframe: Current
Medium: Soil
Exposure Medium: Soil
Exposure Point: Discharge Point 3
Receptor Population: Construction Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Arsenic (Total)	4.5	mg/kg	4.5	mg/kg	M	5.3E-06	mg/kg-day	3.0E-04	mg/kg-day	N/A	N/A	1.8E-02
													1.8E-02
Dermal	Arsenic (Total)	4.5	mg/kg	4.5	mg/kg	M	3.3E-06	mg/kg-day	3.0E-04	mg/kg-day	N/A	N/A	1.1E-02
													1.1E-02
Inhalation	Arsenic (Total)	4.5	mg/kg	4.5	mg/kg	M	4.4E-08	mg/kg-day	N/A	mg/kg-day	N/A	N/A	
											Total Hazard Index Across All Exposure Routes/Pathways		2.9E-02

Definitions: RME = Reasonable Maximum Exposure
EPC = Exposure Point Concentration
mg/kg = milligrams per kilogram
mg/kg-day = milligram per kilogram per day
N/A = Not applicable
M = Medium-specific EPC selected for hazard calculation.

TABLE 6-48
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
Jet Propulsion Laboratory -- Operable Unit-2

Scenario Timeframe: Current
Medium: Soil
Exposure Medium: Soil
Exposure Point: Discharge Point 3
Receptor Population: Commercial Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Arsenic	4.5	mg/kg	4.5	mg/kg	M	5.5E-07	mg/kg-day	3.0E-04	mg/kg-day	N/A	N/A	1.8E-03
	(Total)												1.8E-03
Dermal	Arsenic	4.5	mg/kg	4.5	mg/kg	M	3.3E-06	mg/kg-day	3.0E-04	mg/kg-day	N/A	N/A	1.1E-02
	(Total)												1.1E-02
Inhalation	Arsenic	4.5	mg/kg	4.5	mg/kg	M	4.4E-08	mg/kg-day	N/A	mg/kg-day	N/A	N/A	
	(Total)												
												Total Hazard Index Across All Exposure Routes/Pathways	1.3E-02

Definitions: RME = Reasonable Maximum Exposure
EPC = Exposure Point Concentration
mg/kg = milligrams per kilogram
mg/kg-day = milligram per kilogram per day
N/A = Not applicable
M = Medium-specific EPC selected for hazard calculation.

TABLE 6-49
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
Jet Propulsion Laboratory -- Operable Unit-2

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Soil
Exposure Point: Discharge Point 4
Receptor Population: On-site Resident
Receptor Age: Child/Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Arsenic (Total)	4.7	mg/kg	4.7	mg/kg	M	6.0E-05	mg/kg-day	3.0E-04	mg/kg-day	N/A	N/A	2.0E-01
													2.0E-01
Dermal	Arsenic (Total)	4.7	mg/kg	4.7	mg/kg	M	1.8E-05	mg/kg-day	3.0E-04	mg/kg-day	N/A	N/A	6.0E-02
													6.0E-02
Inhalation	Arsenic (Total)	4.7	mg/kg	4.7	mg/kg	M	1.5E-07	mg/kg-day	N/A	mg/kg-day	N/A	N/A	
											Total Hazard Index Across All Exposure Routes/Pathways		2.6E-01

Definitions: RME = Reasonable Maximum Exposure
EPC = Exposure Point Concentration
mg/kg = milligrams per kilogram
mg/kg-day = milligram per kilogram per day
N/A = Not applicable
M = Medium-specific EPC selected for hazard calculation.

TABLE 6-50
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
Jet Propulsion Laboratory -- Operable Unit-2

Scenario Timeframe: Current
Medium: Soil
Exposure Medium: Soil
Exposure Point: Discharge Point 4
Receptor Population: Construction Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Arsenic (Total)	4.7	mg/kg	4.7	mg/kg	M	5.5E-06	mg/kg-day	3.0E-04	mg/kg-day	N/A	N/A	1.8E-02
													1.8E-02
Dermal	Arsenic (Total)	4.7	mg/kg	4.7	mg/kg	M	3.4E-06	mg/kg-day	3.0E-04	mg/kg-day	N/A	N/A	1.1E-02
													1.1E-02
Inhalation	Arsenic (Total)	4.7	mg/kg	4.7	mg/kg	M	4.6E-08	mg/kg-day	N/A	mg/kg-day	N/A	N/A	
												Total Hazard Index Across All Exposure Routes/Pathways	3.0E-02

Definitions: RME = Reasonable Maximum Exposure
EPC = Exposure Point Concentration
mg/kg = milligrams per kilogram
mg/kg-day = milligram per kilogram per day
N/A = Not applicable
M = Medium-specific EPC selected for hazard calculation.

TABLE 6-51
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
Jet Propulsion Laboratory -- Operable Unit-2

Scenario Timeframe: Current
Medium: Soil
Exposure Medium: Soil
Exposure Point: Discharge Point 4
Receptor Population: Commercial Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Arsenic (Total)	4.7	mg/kg	4.7	mg/kg	M	5.7E-07	mg/kg-day	3.0E-04	mg/kg-day	N/A	N/A	1.9E-03
													1.9E-03
Dermal	Arsenic (Total)	4.7	mg/kg	4.7	mg/kg	M	3.4E-06	mg/kg-day	3.0E-04	mg/kg-day	N/A	N/A	1.1E-02
													1.1E-02
Inhalation	Arsenic (Total)	4.7	mg/kg	4.7	mg/kg	M	4.6E-08	mg/kg-day	N/A	mg/kg-day	N/A	N/A	
												Total Hazard Index Across All Exposure Routes/Pathways	1.3E-02

Definitions: RME = Reasonable Maximum Exposure
EPC = Exposure Point Concentration
mg/kg = milligrams per kilogram
mg/kg-day = milligram per kilogram per day
N/A = Not applicable
M = Medium-specific EPC selected for hazard calculation.

TABLE 6-52
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
Jet Propulsion Laboratory -- Operable Unit-2

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Soil
Exposure Point: Waste Pit 1/Discharge Point 1
Receptor Population: On-site Resident
Receptor Age: Child/Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Arochlor-1254	0.20	mg/kg	0.20	mg/kg	M	2.6E-06	mg/kg-day	2.0E-05	mg/kg-day	N/A	N/A	0.13
	Arochlor-1260	0.27	mg/kg	0.27	mg/kg	M	3.5E-06	mg/kg-day	N/A	N/A	N/A	N/A	
	Arsenic	3.00	mg/kg	3.00	mg/kg	M	3.8E-05	mg/kg-day	3.0E-04	mg/kg-day	N/A	N/A	0.13
	Chromium (VI)	0.84	mg/kg	0.84	mg/kg	M	1.1E-05	mg/kg-day	3.0E-03	mg/kg-day	N/A	N/A	0.0036
	(Total)												0.26
Dermal	Arochlor-1254	0.20	mg/kg	0.20	mg/kg	M	3.8E-06	mg/kg-day	2.0E-05	mg/kg-day	N/A	N/A	0.19
	Arochlor-1260	0.27	mg/kg	0.27	mg/kg	M	5.2E-06	mg/kg-day	N/A	N/A	N/A	N/A	
	Arsenic	3.00	mg/kg	3.00	mg/kg	M	5.8E-05	mg/kg-day	3.0E-04	mg/kg-day	N/A	N/A	0.19
	Chromium (VI)	0.84	mg/kg	0.84	mg/kg	M	0.0E+00	mg/kg-day	6.0E-04	mg/kg-day	N/A	N/A	0.0
	(Total)												0.38
Inhalation	Arochlor-1254	0.20	mg/kg	0.20	mg/kg	M	6.4E-09	mg/kg-day	2.0E-05	mg/kg-day	N/A	N/A	0.00032
	Arochlor-1260	0.27	mg/kg	0.27	mg/kg	M	8.6E-09	mg/kg-day	N/A	N/A	N/A	N/A	
	Arsenic	3.00	mg/kg	3.00	mg/kg	M	9.6E-08	mg/kg-day	N/A	N/A	N/A	N/A	
	Chromium (VI)	0.84	mg/kg	0.84	mg/kg	M	2.7E-08	mg/kg-day	2.3E-06	mg/kg-day	N/A	N/A	0.012
	(Total)												0.012
												Total Hazard Index Across All Exposure Routes/Pathways	0.65

Definitions: RME = reasonable maximum exposure
EPC = exposure point concentration
mg/kg = milligrams per kilogram
mg/kg-day = milligrams per kilogram per day
N/A = Not applicable
M = Medium-specific EPC selected for hazard calculation.

TABLE 6-53
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
Jet Propulsion Laboratory – Operable Unit-2

Scenario Timeframe: Current
Medium: Soil
Exposure Medium: Soil
Exposure Point: Waste Pit 1/Discharge Point 1
Receptor Population: Construction Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Arochlor-1254	0.2	mg/kg	0.2	mg/kg	M	2.3E-07	mg/kg-day	5.0E-05	mg/kg-day	N/A	N/A	0.0047
	Arochlor-1260	0.27	mg/kg	0.27	mg/kg	M	3.2E-07	mg/kg-day	N/A	N/A	N/A	N/A	
	Arsenic	3.0	mg/kg	3.0	mg/kg	M	3.5E-06	mg/kg-day	3.0E-04	mg/kg-day	N/A	N/A	0.012
	Chromium (VI)	0.84	mg/kg	0.84	mg/kg	M	9.9E-07	mg/kg-day	2.0E-02	mg/kg-day	N/A	N/A	0.000049
	(Total)												0.016
Dermal	Arochlor-1254	0.2	mg/kg	0.2	mg/kg	M	7.3E-07	mg/kg-day	5.0E-05	mg/kg-day	N/A	N/A	0.015
	Arochlor-1260	0.27	mg/kg	0.27	mg/kg	M	9.9E-07	mg/kg-day	N/A	N/A	N/A	N/A	
	Arsenic	3.0	mg/kg	3.0	mg/kg	M	1.1E-05	mg/kg-day	3.0E-04	mg/kg-day	N/A	N/A	0.037
	Chromium (VI)	0.84	mg/kg	0.84	mg/kg	M	0.0E+00	mg/kg-day	0.0E+00	mg/kg-day	N/A	N/A	0.00
	(Total)												0.051
Inhalation	Arochlor-1254	0.2	mg/kg	0.2	mg/kg	M	2.0E-09	mg/kg-day	2.0E-05	mg/kg-day	N/A	N/A	0.00010
	Arochlor-1260	0.27	mg/kg	0.27	mg/kg	M	2.6E-09	mg/kg-day	N/A	N/A	N/A	N/A	
	Arsenic	3.0	mg/kg	3.0	mg/kg	M	2.9E-08	mg/kg-day	N/A	mg/kg-day	N/A	N/A	
	Chromium (VI)	0.84	mg/kg	0.84	mg/kg	M	8.2E-09	mg/kg-day	2.3E-06	mg/kg-day	N/A	N/A	0.0036
	(Total)												0.0036
										Total Hazard Index Across All Exposure Routes/Pathways			0.072

Definitions: RME = reasonable maximum exposure
EPC = exposure point concentration
mg/kg = milligrams per kilogram
mg/kg-day = milligrams per kilogram per day
N/A = Not applicable
M = Medium-specific EPC selected for hazard calculation.

TABLE 6-54
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
Jet Propulsion Laboratory -- Operable Unit-2

Scenario Timeframe: Current
Medium: Soil
Exposure Medium: Soil
Exposure Point: Waste Pit 1/Discharge Point 1
Receptor Population: Commercial Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Arochlor-1254	0.20	mg/kg	0.20	mg/kg	M	2.4E-08	mg/kg-day	2.0E-05	mg/kg-day	N/A	N/A	0.0012
	Arochlor-1260	0.27	mg/kg	0.27	mg/kg	M	3.3E-08	mg/kg-day					
	Arsenic	3.00	mg/kg	3.00	mg/kg	M	3.7E-04	mg/kg-day	3.0E-04	mg/kg-day	N/A	N/A	0.0012
	Chromium (VI)	0.84	mg/kg	0.84	mg/kg	M	1.0E-07	mg/kg-day	3.0E-03	mg/kg-day	N/A	N/A	0..000034
	(Total)												0.0025
Dermal	Arochlor-1254	0.20	mg/kg	0.20	mg/kg	M	7.3E-07	mg/kg-day	2.0E-05	mg/kg-day	N/A	N/A	0.015
	Arochlor-1260	0.27	mg/kg	0.27	mg/kg	M	9.9E-07	mg/kg-day					
	Arsenic	3.00	mg/kg	3.00	mg/kg	M	1.1E-05	mg/kg-day	3.0E-04	mg/kg-day	N/A	N/A	0.037
	Chromium (VI)	0.84	mg/kg	0.84	mg/kg	M	0.0E+00	mg/kg-day	6.0E-04	mg/kg-day	N/A	N/A	0.000
	(Total)												0.051
Inhalation	Arochlor-1254	0.20	mg/kg	0.20	mg/kg	M	2.0E-09	mg/kg-day	2.0E-05	mg/kg-day	N/A	N/A	0.00010
	Arochlor-1260	0.27	mg/kg	0.27	mg/kg	M	2.6E-09	mg/kg-day					
	Arsenic	3.00	mg/kg	3.00	mg/kg	M	2.9E-08	mg/kg-day	N/A	N/A	N/A	N/A	
	Chromium (VI)	0.84	mg/kg	0.84	mg/kg	M	8.2E-09	mg/kg-day	2.3E-06	mg/kg-day	N/A	N/A	0.0036
	(Total)												0.0036
										Total Hazard Index Across All Exposure Routes/Pathways			0.058

Definitions: RME = reasonable maximum exposure
EPC = exposure point concentration
mg/kg = milligrams per kilogram
mg/kg-day = milligrams per kilogram per day
N/A = Not applicable
M = Medium-specific EPC selected for hazard calculation.

TABLE 6-55
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
Jet Propulsion Laboratory -- Operable Unit-2

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Soil
Exposure Point: Waste Pit 4
Receptor Population: On-site Resident
Receptor Age: Child/Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Arsenic (Total)	5.6	mg/kg	5.6	mg/kg	M	7.2E-05	mg/kg-day	3.0E-04	mg/kg-day	N/A	N/A	0.24
													0.24
Dermal	Arsenic (Total)	5.6	mg/kg	5.6	mg/kg	M	2.1E-05	mg/kg-day	3.0E-04	mg/kg-day	N/A	N/A	0.072
													0.072
Inhalation	Arsenic (Total)	5.6	mg/kg	5.6	mg/kg	M	1.8E-07	mg/kg-day	N/A	mg/kg-day	N/A	N/A	
											Total Hazard Index Across All Exposure Routes/Pathways		0.31

Definitions: RME = reasonable maximum exposure
EPC = exposure point concentration
mg/kg = milligrams per kilogram
mg/kg-day = milligrams per kilogram per day
N/A = Not applicable
M = Medium-specific EPC selected for hazard calculation

TABLE 6-56
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
Jet Propulsion Laboratory -- Operable Unit-2

Scenario Timeframe: Current
Medium: Soil
Exposure Medium: Soil
Exposure Point: Waste Pit 4
Receptor Population: Construction Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Arsenic (Total)	5.6	mg/kg	5.6	mg/kg	M	6.6E-06	mg/kg-day	3.0E-04	mg/kg-day	N/A	N/A	0.022
													0.022
Dermal	Arsenic (Total)	5.6	mg/kg	5.6	mg/kg	M	4.1E-06	mg/kg-day	3.0E-04	mg/kg-day	N/A	N/A	0.014
													0.014
Inhalation	Arsenic (Total)	5.6	mg/kg	5.6	mg/kg	M	5.5E-08	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
												Total Hazard Index Across All Exposure Routes/Pathways	0.036

Definitions: RME = reasonable maximum exposure
EPC = exposure point concentration
mg/kg = milligrams per kilogram
mg/kg-day = milligrams per kilogram per day
N/A = Not applicable
M = Medium-specific EPC selected for hazard calculation

TABLE 6-57
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
Jet Propulsion Laboratory -- Operable Unit-2

Scenario Timeframe: Current
Medium: Soil
Exposure Medium: Soil
Exposure Point: Waste Pit 4
Receptor Population: Commercial Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Arsenic (Total)	5.6	mg/kg	5.6	mg/kg	M	6.8E-07	mg/kg-day	3.0E-04	mg/kg-day	N/A	N/A	0.0023
													0.0023
Dermal	Arsenic (Total)	5.6	mg/kg	5.6	mg/kg	M	4.1E-06	mg/kg-day	3.0E-04	mg/kg-day	N/A	N/A	0.014
													0.014
Inhalation	Arsenic (Total)	5.6	mg/kg	5.6	mg/kg	M	5.5E-08	mg/kg-day	N/A	mg/kg-day	N/A	N/A	
												Total Hazard Index Across All Exposure Routes/Pathways	0.016

Definitions: RME = reasonable maximum exposure
EPC = exposure point concentration
mg/kg = milligrams per kilogram
mg/kg-day = milligrams per kilogram per day
N/A = Not applicable
M = Medium-specific EPC selected for hazard calculation

TABLE 6-58
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
Jet Propulsion Laboratory – Operable Unit-2

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Soil
Exposure Point: Discharge Point 2
Receptor Population: On-site Resident
Receptor Age: Child/Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Chromium (VI)	0.28	mg/kg	0.28	mg/kg	M	4.4E-07	mg/kg-day	0.42	mg/kg-day $^{-1}$	1.8E-07
	(Total)										1.8E-07
Dermal	Chromium (VI) (a)	0.28	mg/kg	0.28	mg/kg	M	0.0E+00	mg/kg-day	2.1	mg/kg-day $^{-1}$	0.0E+00
	(Total)										0.0E+00
Inhalation	Chromium (VI)	0.28	mg/kg	0.28	mg/kg	M	1.1E-09	mg/kg-day	510	mg/kg-day $^{-1}$	5.8E-07
	(Total)										5.8E-07
										Total Risk Across All Exposure Routes/Pathways	7.7E-07

Notes: (a)Chromium (VI) is assumed to have 0% dermal absorption

Definitions: RME = reasonable maximum exposure
EPC = exposure point concentration
mg/kg = milligrams per kilogram
mg/kg-day = milligrams per kilogram per day
N/A = Not applicable
M = Medium-specific EPC selected for hazard calculation

TABLE 6-59
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
Jet Propulsion Laboratory -- Operable Unit-2

Scenario Timeframe: Current
Medium: Soil
Exposure Medium: Soil
Exposure Point: Discharge Point 2
Receptor Population: Construction Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Chromium (VI)	0.28	mg/kg	0.28	mg/kg	M	4.7E-09	mg/kg-day	0.42	mg/kg-day $^{-1}$	2.0E-09
	(Total)										2.0E-09
Dermal	Chromium (VI) (a)	0.28	mg/kg	0.28	mg/kg	M	0.0E+00	mg/kg-day	2.1	mg/kg-day $^{-1}$	0.0E+00
	(Total)										0.0E+00
Inhalation	Chromium (VI)	0.28	mg/kg	0.28	mg/kg	M	3.9E-11	mg/kg-day	510	mg/kg-day $^{-1}$	2.0E-08
	(Total)										2.0E-08
										Total Risk Across All Exposure Routes/Pathways	2.2E-08

Notes: (a)Chromium (VI) is assumed to have 0% dermal absorption

Definitions: RME = reasonable maximum exposure
EPC = exposure point concentration
mg/kg = milligrams per kilogram
mg/kg-day = milligrams per kilogram per day
N/A = Not applicable
M = Medium-specific EPC selected for hazard calculation

TABLE 6-60
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
Jet Propulsion Laboratory -- Operable Unit-2

Scenario Timeframe: Current
Medium: Soil
Exposure Medium: Soil
Exposure Point: Discharge Point 2
Receptor Population: Commercial Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Chromium (VI)	0.28	mg/kg	0.28	mg/kg	M	1.2E-08	mg/kg-day	0.42	mg/kg-day $^{-1}$	5.1E-09
	(Total)										5.1E-09
Dermal	Chromium (VI) (a)	0.28	mg/kg	0.28	mg/kg	M	0.0E+00	mg/kg-day	2.1	mg/kg-day $^{-1}$	0.0E+00
	(Total)										0.0E+00
Inhalation	Chromium (VI)	0.28	mg/kg	0.28	mg/kg	M	9.8E-10	mg/kg-day	510	mg/kg-day $^{-1}$	5.0E-07
	(Total)										5.0E-07
										Total Risk Across All Exposure Routes/Pathways	5.0E-07

Notes: (a)Chromium (VI) is assumed to have 0% dermal absorption

Definitions: RME = reasonable maximum exposure
EPC = exposure point concentration
mg/kg = milligrams per kilogram
mg/kg-day = milligrams per kilogram per day
N/A = Not applicable
M = Medium-specific EPC selected for hazard calculation

TABLE 6-61
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
Jet Propulsion Laboratory -- Operable Unit-2

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Soil
Exposure Point: Discharge Point 3
Receptor Population: On-site Resident
Receptor Age: Child/Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Arsenic (Total)	4.5	mg/kg	4.5	mg/kg	M	7.0E-06	mg/kg-day	1.5	mg/kg-day $^{-1}$	1.1E-05
											1.1E-05
Dermal	Arsenic (Total)	4.5	mg/kg	4.5	mg/kg	M	2.5E-06	mg/kg-day	1.5	mg/kg-day $^{-1}$	3.8E-06
											3.8E-06
Inhalation	Arsenic (Total)	4.5	mg/kg	4.5	mg/kg	M	1.8E-08	mg/kg-day	12	mg/kg-day $^{-1}$	2.2E-07
											2.2E-07
										Total Risk Across All Exposure Routes/Pathways	1.5E-05

Definitions: RME = Reasonable Maximum Exposure
EPC = Exposure Point Concentration
mg/kg = milligrams per kilogram
mg/kg-day = milligram per kilogram per day
N/A = Not applicable
M = Medium-specific EPC selected for hazard calculation.

TABLE 6-62
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
Jet Propulsion Laboratory -- Operable Unit-2

Scenario Timeframe: Current
Medium: Soil
Exposure Medium: Soil
Exposure Point: Discharge Point 3
Receptor Population: Construction Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Arsenic (Total)	4.5	mg/kg	4.5	mg/kg	M	7.5E-08	mg/kg-day	1.5	mg/kg-day $^{-1}$	1.1E-07
											1.1E-07
Dermal	Arsenic (Total)	4.5	mg/kg	4.5	mg/kg	M	4.7E-08	mg/kg-day	1.5	mg/kg-day $^{-1}$	7.1E-08
											7.1E-08
Inhalation	Arsenic (Total)	4.5	mg/kg	4.5	mg/kg	M	6.3E-10	mg/kg-day	12	mg/kg-day $^{-1}$	7.5E-09
											7.5E-09
										Total Risk Across All Exposure Routes/Pathways	1.9E-07

Definitions: RME = Reasonable Maximum Exposure
EPC = Exposure Point Concentration
mg/kg = milligrams per kilogram
mg/kg-day = milligram per kilogram per day
N/A = Not applicable
M = Medium-specific EPC selected for hazard calculation.

TABLE 6-63
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
Jet Propulsion Laboratory -- Operable Unit-2

Scenario Timeframe: Current
Medium: Soil
Exposure Medium: Soil
Exposure Point: Discharge Point 3
Receptor Population: Office Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Arsenic (Total)	4.5	mg/kg	4.5	mg/kg	M	2.0E-07	mg/kg-day	1.5	mg/kg-day $^{-1}$	2.9E-07
											2.9E-07
Dermal	Arsenic (Total)	4.5	mg/kg	4.5	mg/kg	M	1.2E-06	mg/kg-day	1.5	mg/kg-day $^{-1}$	1.8E-06
											1.8E-06
Inhalation	Arsenic (Total)	4.5	mg/kg	4.5	mg/kg	M	1.6E-08	mg/kg-day	12	mg/kg-day $^{-1}$	1.9E-07
											1.9E-07
										Total Risk Across All Exposure Routes/Pathways	2.3E-06

Definitions: RME = Reasonable Maximum Exposure
EPC = Exposure Point Concentration
mg/kg = milligrams per kilogram
mg/kg-day = milligram per kilogram per day
N/A = Not applicable
M = Medium-specific EPC selected for hazard calculation.

TABLE 6-64
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
Jet Propulsion Laboratory -- Operable Unit-2

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Soil
Exposure Point: Discharge Point 4
Receptor Population: On-site Resident
Receptor Age: Child/Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Arsenic (Total)	4.7	mg/kg	4.7	mg/kg	M	7.4E-06	mg/kg-day	1.5	mg/kg-day $^{-1}$	1.1E-05
											1.1E-05
Dermal	Arsenic (Total)	4.7	mg/kg	4.7	mg/kg	M	2.6E-06	mg/kg-day	1.5	mg/kg-day $^{-1}$	4.0E-06
											4.0E-06
Inhalation	Arsenic (Total)	4.7	mg/kg	4.7	mg/kg	M	1.9E-08	mg/kg-day	12	mg/kg-day $^{-1}$	2.3E-07
											2.3E-07
										Total Risk Across All Exposure Routes/Pathways	1.5E-05

Definitions: RME = Reasonable Maximum Exposure
EPC = Exposure Point Concentration
mg/kg = milligrams per kilogram
mg/kg-day = milligram per kilogram per day
N/A = Not applicable
M = Medium-specific EPC selected for hazard calculation.

TABLE 6-65
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
Jet Propulsion Laboratory -- Operable Unit-2

Scenario Timeframe: Current
Medium: Soil
Exposure Medium: Soil
Exposure Point: Discharge Point 4
Receptor Population: Construction Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Arsenic (Total)	4.7	mg/kg	4.7	mg/kg	M	7.9E-08	mg/kg-day	1.5	mg/kg-day $^{-1}$	1.2E-07
											1.2E-07
Dermal	Arsenic (Total)	4.7	mg/kg	4.7	mg/kg	M	4.9E-08	mg/kg-day	1.5	mg/kg-day $^{-1}$	7.4E-08
											7.4E-08
Inhalation	Arsenic (Total)	4.7	mg/kg	4.7	mg/kg	M	6.6E-10	mg/kg-day	12	mg/kg-day $^{-1}$	7.9E-09
											7.9E-09
										Total Risk Across All Exposure Routes/Pathways	2.0E-07

Definitions: RME = Reasonable Maximum Exposure
EPC = Exposure Point Concentration
mg/kg = milligrams per kilogram
mg/kg-day = milligram per kilogram per day
N/A = Not applicable
M = Medium-specific EPC selected for hazard calculation.

TABLE 6-66
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
Jet Propulsion Laboratory -- Operable Unit-2

Scenario Timeframe: Current
Medium: Soil
Exposure Medium: Soil
Exposure Point: Discharge Point 4
Receptor Population: Office Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Arsenic (Total)	4.7	mg/kg	4.7	mg/kg	M	2.1E-07	mg/kg-day	1.5	mg/kg-day $^{-1}$	3.1E-07
											3.1E-07
Dermal	Arsenic (Total)	4.7	mg/kg	4.7	mg/kg	M	1.2E-06	mg/kg-day	1.5	mg/kg-day $^{-1}$	1.8E-06
											1.8E-06
Inhalation	Arsenic (Total)	4.7	mg/kg	4.7	mg/kg	M	1.6E-08	mg/kg-day	12	mg/kg-day $^{-1}$	2.0E-07
											2.0E-07
										Total Risk Across All Exposure Routes/Pathways	2.4E-06

Definitions: RME = Reasonable Maximum Exposure
EPC = Exposure Point Concentration
mg/kg = milligrams per kilogram
mg/kg-day = milligram per kilogram per day
N/A = Not applicable
M = Medium-specific EPC selected for hazard calculation.

TABLE 6-67
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
Jet Propulsion Laboratory – Operable Unit-2

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Soil
Exposure Point: Waste Pit 1/Discharge Point 1
Receptor Population: On-site Resident
Receptor Age: Child/Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Arochlor-1254	0.20	mg/kg	0.20	mg/kg	M	3.1E-07	mg/kg-day	2.0	mg/kg-day $^{-1}$	6.3E-07
	Arochlor-1260	0.27	mg/kg	0.27	mg/kg	M	4.2E-07	mg/kg-day	2.0	mg/kg-day $^{-1}$	8.5E-07
	Arsenic	3.0	mg/kg	3.0	mg/kg	M	4.7E-06	mg/kg-day	1.5	mg/kg-day $^{-1}$	7.0E-06
	Chromium (VI)	0.84	mg/kg	0.08	mg/kg	M	1.3E-07	mg/kg-day	0.42	mg/kg-day $^{-1}$	5.5E-08
	(Total)										8.6E-06
Dermal	Arochlor-1254	0.20	mg/kg	0.20	mg/kg	M	5.6E-07	mg/kg-day	2.0	mg/kg-day $^{-1}$	1.1E-06
	Arochlor-1260	0.27	mg/kg	0.27	mg/kg	M	7.6E-07	mg/kg-day	2.0	mg/kg-day $^{-1}$	1.5E-06
	Arsenic	3.0	mg/kg	3.0	mg/kg	M	8.4E-06	mg/kg-day	1.5	mg/kg-day $^{-1}$	1.3E-05
	Chromium (VI)	0.84	mg/kg	0.84	mg/kg	M	0.0E+00	mg/kg-day	2.1	mg/kg-day $^{-1}$	0.0E+00
	(Total)										1.5E-05
Inhalation	Arochlor-1254	0.20	mg/kg	0.20	mg/kg	M	8.2E-10	mg/kg-day	2.0	mg/kg-day $^{-1}$	1.6E-09
	Arochlor-1260	0.27	mg/kg	0.27	mg/kg	M	1.1E-09	mg/kg-day	2.0	mg/kg-day $^{-1}$	2.2E-09
	Arsenic	3.0	mg/kg	3.0	mg/kg	M	1.2E-08	mg/kg-day	12	mg/kg-day $^{-1}$	1.5E-07
	Chromium (VI)	0.84	mg/kg	0.84	mg/kg	M	3.4E-09	mg/kg-day	510	mg/kg-day $^{-1}$	1.7E-06
	(Total)										1.9E-06
										Total Risk Across All Exposure Routes/Pathways	2.6E-05

Definitions: RME = Reasonable Maximum Exposure
EPC = Exposure Point Concentration
mg/kg = milligrams per kilogram
mg/kg-day = milligram per kilogram per day
N/A = Not applicable
M = Medium-specific EPC selected for hazard calculation.

TABLE 6-68
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
Jet Propulsion Laboratory -- Operable Unit-2

Scenario Timeframe: Current
Medium: Soil
Exposure Medium: Soil
Exposure Point: Waste Pit 1/Discharge Point 1
Receptor Population: Construction Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Arochlor-1254	0.2	mg/kg	0.2	mg/kg	M	3.4E-09	mg/kg-day	2.0	mg/kg-day $^{-1}$	6.7E-09
	Arochlor-1260	0.27	mg/kg	0.27	mg/kg	M	4.5E-09	mg/kg-day	2.0	mg/kg-day $^{-1}$	9.1E-09
	Arsenic	3.0	mg/kg	3.0	mg/kg	M	5.0E-08	mg/kg-day	1.5	mg/kg-day $^{-1}$	7.5E-08
	Chromium (VI)	0.84	mg/kg	0.84	mg/kg	M	1.4E-08	mg/kg-day	0.42	mg/kg-day $^{-1}$	5.9E-09
	(Total)										9.7E-08
Dermal	Arochlor-1254	0.2	mg/kg	0.2	mg/kg	M	1.0E-08	mg/kg-day	2.0	mg/kg-day $^{-1}$	2.1E-08
	Arochlor-1260	0.27	mg/kg	0.27	mg/kg	M	1.4E-08	mg/kg-day	2.0	mg/kg-day $^{-1}$	2.8E-08
	Arsenic	3.0	mg/kg	3.0	mg/kg	M	1.6E-07	mg/kg-day	1.5	mg/kg-day $^{-1}$	2.4E-07
	Chromium (VI)	0.84	mg/kg	0.84	mg/kg	M	0.0E+00	mg/kg-day	2.1	mg/kg-day $^{-1}$	0.0E+00
	(Total)										2.9E-07
Inhalation	Arochlor-1254	0.2	mg/kg	0.2	mg/kg	M	2.8E-11	mg/kg-day	2.0	mg/kg-day $^{-1}$	5.6E-11
	Arochlor-1260	0.27	mg/kg	0.27	mg/kg	M	3.8E-11	mg/kg-day	2.0	mg/kg-day $^{-1}$	7.5E-11
	Arsenic	3.0	mg/kg	3.0	mg/kg	M	4.2E-10	mg/kg-day	12	mg/kg-day $^{-1}$	5.0E-09
	Chromium (VI)	0.84	mg/kg	0.84	mg/kg	M	1.2E-10	mg/kg-day	5.1E+02	mg/kg-day $^{-1}$	6.0E-08
	(Total)										6.5E-08
										Total Risk Across All Exposure Routes/Pathways	4.5E-07

Definitions: RME = Reasonable Maximum Exposure
EPC = Exposure Point Concentration
mg/kg = milligrams per kilogram
mg/kg-day = milligram per kilogram per day
N/A = Not applicable
M = Medium-specific EPC selected for hazard calculation.

TABLE 6-69
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
Jet Propulsion Laboratory -- Operable Unit-2

Scenario Timeframe: Current
Medium: Soil
Exposure Medium: Soil
Exposure Point: Waste Pit 1/Discharge Point 1
Receptor Population: Commercial Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Arochlor-1254	0.2	mg/kg	0.2	mg/kg	M	8.7E-09	mg/kg-day	2.0	mg/kg-day $^{-1}$	1.7E-08
	Arochlor-1260	0.27	mg/kg	0.27	mg/kg	M	1.2E-08	mg/kg-day	2.0	mg/kg-day $^{-1}$	2.4E-08
	Arsenic	3.0	mg/kg	3.0	mg/kg	M	1.3E-07	mg/kg-day	1.5	mg/kg-day $^{-1}$	2.0E-07
	Chromium (VI)	0.84	mg/kg	0.84	mg/kg	M	3.7E-08	mg/kg-day	0.42	mg/kg-day $^{-1}$	1.5E-08
	(Total)										2.5E-07
Dermal	Arochlor-1254	0.2	mg/kg	0.2	mg/kg	M	2.6E-07	mg/kg-day	2.0	mg/kg-day $^{-1}$	5.2E-07
	Arochlor-1260	0.27	mg/kg	0.27	mg/kg	M	3.5E-07	mg/kg-day	2.0	mg/kg-day $^{-1}$	7.1E-07
	Arsenic	3.0	mg/kg	3.0	mg/kg	M	3.9E-06	mg/kg-day	1.5	mg/kg-day $^{-1}$	5.9E-06
	Chromium (VI)	0.84	mg/kg	0.84	mg/kg	M	0.0E+00	mg/kg-day	2.1	mg/kg-day $^{-1}$	0.0E+00
	(Total)										7.1E-06
Inhalation	Arochlor-1254	0.2	mg/kg	0.2	mg/kg	M	7.0E-10	mg/kg-day	2.0	mg/kg-day $^{-1}$	1.4E-09
	Arochlor-1260	0.27	mg/kg	0.27	mg/kg	M	9.4E-10	mg/kg-day	2.0	mg/kg-day $^{-1}$	1.9E-09
	Arsenic	3.0	mg/kg	3.0	mg/kg	M	1.0E-08	mg/kg-day	12	mg/kg-day $^{-1}$	1.3E-07
	Chromium (VI)	0.84	mg/kg	0.84	mg/kg	M	2.9E-09	mg/kg-day	5.1E+02	mg/kg-day $^{-1}$	1.5E-06
	(Total)										1.6E-06
										Total Risk Across All Exposure Routes/Pathways	9.0E-06

Definitions: RME = Reasonable Maximum Exposure
EPC = Exposure Point Concentration
mg/kg = milligrams per kilogram
mg/kg-day = milligram per kilogram per day
N/A = Not applicable
M = Medium-specific EPC selected for hazard calculation.

TABLE 6-70
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
Jet Propulsion Laboratory -- Operable Unit-2

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Soil
Exposure Point: Waste Pit 4
Receptor Population: On-site Resident
Receptor Age: Child/Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Arsenic	5.6	mg/kg	5.6	mg/kg	M	8.8E-06	mg/kg-day	1.5	mg/kg-day $^{-1}$	1.3E-05
	(Total)										1.3E-05
Dermal	Arsenic	5.6	mg/kg	5.6	mg/kg	M	3.1E-06	mg/kg-day	1.5	mg/kg-day $^{-1}$	4.7E-06
	(Total)										4.7E-06
Inhalation	Arsenic	5.6	mg/kg	5.6	mg/kg	M	2.3E-08	mg/kg-day	12	mg/kg-day $^{-1}$	2.7E-07
	(Total)										2.7E-07
										Total Risk Across All Exposure Routes/Pathways	1.8E-05

Definitions: RME = reasonable maximum exposure
EPC = exposure point concentration
mg/kg = milligrams per kilogram
mg/kg-day = milligrams per kilogram per day
N/A = Not applicable
M = Medium-specific EPC selected for hazard calculation

TABLE 6-71
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
Jet Propulsion Laboratory -- Operable Unit-2

Scenario Timeframe: Current
Medium: Soil
Exposure Medium: Soil
Exposure Point: Waste Pit 4
Receptor Population: Construction Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Arsenic (Total)	5.6	mg/kg	5.6	mg/kg	M	9.4E-08	mg/kg-day	1.5	mg/kg-day $^{-1}$	1.4E-07
											1.4E-07
Dermal	Arsenic (Total)	5.6	mg/kg	5.6	mg/kg	M	5.9E-08	mg/kg-day	1.5	mg/kg-day $^{-1}$	8.8E-08
											8.8E-08
Inhalation	Arsenic (Total)	5.6	mg/kg	5.6	mg/kg	M	7.8E-10	mg/kg-day	12	mg/kg-day $^{-1}$	9.4E-09
											9.4E-09
										Total Risk Across All Exposure Routes/Pathways	2.4E-07

Definitions: RME = reasonable maximum exposure
EPC = exposure point concentration
mg/kg = milligrams per kilogram
mg/kg-day = milligrams per kilogram per day
N/A = Not applicable
M = Medium-specific EPC selected for hazard calculation

TABLE 6-72
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
Jet Propulsion Laboratory -- Operable Unit-2

Scenario Timeframe: Current
Medium: Soil
Exposure Medium: Soil
Exposure Point: Waste Pit 4
Receptor Population: Commercial Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Arsenic (Total)	5.6	mg/kg	5.6	mg/kg	M	2.4E-07	mg/kg-day	1.5	mg/kg-day $^{-1}$	3.7E-07
											3.7E-07
Dermal	Arsenic (Total)	5.6	mg/kg	5.6	mg/kg	M	1.5E-06	mg/kg-day	1.5	mg/kg-day $^{-1}$	2.2E-06
											2.2E-06
Inhalation	Arsenic (Total)	5.6	mg/kg	5.6	mg/kg	M	2.0E-08	mg/kg-day	12	mg/kg-day $^{-1}$	2.3E-07
											2.3E-07
										Total Risk Across All Exposure Routes/Pathways	2.8E-06

Definitions: RME = reasonable maximum exposure
EPC = exposure point concentration
mg/kg = milligrams per kilogram
mg/kg-day = milligrams per kilogram per day
N/A = Not applicable
M = Medium-specific EPC selected for hazard calculation

TABLE 6-73

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

Jet Propulsion Laboratory -- Operable Unit-2

Scenario Timeframe: Future
Receptor Population: On-site Resident
Receptor Age: Child/Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Soil	Discharge Point 2	Chromium (VI)	1.8E-07	5.8E-07	0.0E+00	7.7E-07	Chromium (VI)	none reporte	1.2E-03	3.9E-03	0.0E+00	0.0051
			(Total)	1.8E-07	5.8E-07	0.0E+00	7.7E-07	(Total)		1.2E-03	3.9E-03	0.0E+00	0.0051
							Total Risk Across Soil	7.7E-07					Total Hazard Index Across All Media and All Exposure Routes	0.0051
							Total Risk Across All Media and All Exposure Routes	7.7E-07					

Definitions: RME = reasonable maximum exposure
COPC = chemical of potential concern
N/A = Not applicable
HI = hazard index

TABLE 6-74

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

Jet Propulsion Laboratory -- Operable Unit-2

Scenario Timeframe: Current
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Soil	Discharge Point 2	Chromium (VI)	2.0E-09	2.0E-08	0.0E+00	2.2E-08	Chromium (VI)	none reporte	1.6E-05	1.2E-03	0.0E+00	0.0012
			(Total)	2.0E-09	2.0E-08	0.0E+00	2.2E-08	(Total)		1.6E-05	1.2E-03	0.0E+00	0.0012
						Total Risk Across Soil	2.2E-08					Total Hazard Index Across All Media and All Exposure Routes	0.0012
						Total Risk Across All Media and All Exposure Routes	2.2E-08						

Definitions: RME = reasonable maximum exposure

COPC = chemical of potential concern

N/A = Not applicable

HI = hazard index

Total HI = 0.0012

TABLE 6-75

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

Jet Propulsion Laboratory -- Operable Unit-2

Scenario Timeframe: Current
Receptor Population: Commercial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Soil	Discharge Point 2	Chromium (VI)	5.1E-09	5.0E-07	0.0E+00	5.0E-07	Chromium (VI)	none reporte	1.1E-05	1.2E-03	0.0E+00	0.0012
			(Total)	5.1E-09	5.0E-07	0.0E+00	5.0E-07	(Total)		1.1E-05	1.2E-03	0.0E+00	0.0012
						Total Risk Across Soil	5.0E-07					Total Hazard Index Across All Media and All Exposure Routes	0.0012
						Total Risk Across All Media and All Exposure Routes	5.0E-07						

Total HI = 0.0012

Definitions: RME = reasonable maximum exposure

COPC = chemical of potential concern

N/A = Not applicable

HI = hazard index

TABLE 6-76

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

Jet Propulsion Laboratory -- Operable Unit-2

Scenario Timeframe: Future
Receptor Population: On-site Resident
Receptor Age: Child/Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Soil	Dsicharge Point 3	Arsenic	1.1E-05	2.2E-07	3.8E-06	1.5E-05	Arsenic	skin	1.9E-01	N/A	5.8E-02	0.25
			(Total)	1.1E-05	2.2E-07	3.8E-06	1.5E-05	(Total)		1.9E-01	N/A	5.8E-02	0.25
						Total Risk Across Soil	1.5E-05					Total Hazard Index Across All Media and All Exposure Routes	0.25
						Total Risk Across All Media and All Exposure Routes	1.5E-05						

Total Skin HI = 0.25

Definitions: RME = reasonable maximum exposure

COPC = chemical of potential concern

N/A = Not applicable

HI = hazard index

TABLE 6-77

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

Jet Propulsion Laboratory -- Operable Unit-2

Scenario Timeframe: Current
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Soil	Discharge Point 3	Arsenic	1.1E-07	7.5E-09	7.1E-08	1.9E-07	Arsenic	skin	1.8E-02	N/A	1.1E-02	0.029
			(Total)	1.1E-07	7.5E-09	7.1E-08	1.9E-07	(Total)		1.8E-02	N/A	1.1E-02	0.029
						Total Risk Across Soil	1.9E-07					Total Hazard Index Across All Media and All Exposure Routes	0.029
						Total Risk Across All Media and All Exposure Routes	1.9E-07						

Total Skin HI = 0.029

Definitions: RME = reasonable maximum exposure

COPC = chemical of potential concern

N/A = Not applicable

HI = hazard index

TABLE 6-78

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

Jet Propulsion Laboratory – Operable Unit-2

Scenario Timeframe: Current
Receptor Population: Commercial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Soil	Discharge Point 3	Arsenic	2.9E-07	1.9E-07	1.8E-06	2.3E-06	Arsenic	skin	1.8E-03	N/A	1.1E-02	0.013
			(Total)	2.9E-07	1.9E-07	1.8E-06	2.3E-06	(Total)		1.8E-03	N/A	1.1E-02	0.013
							Total Risk Across Soil	2.3E-06					Total Hazard Index Across All Media and All Exposure Routes	0.013
							Total Risk Across All Media and All Exposure Routes	2.3E-06						

Total Skin HI = 0.013

Definitions: RME = reasonable maximum exposure

COPC = chemical of potential concern

N/A = Not applicable

HI = hazard index

TABLE 6-79

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

Jet Propulsion Laboratory – Operable Unit-2

Scenario Timeframe: Future
Receptor Population: On-site Resident
Receptor Age: Child/Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Soil	Dsicharge Point 4	Arsenic	1.1E-05	2.3E-07	4.0E-06	1.5E-05	Arsenic	skin	2.0E-01	N/A	6.0E-02	0.26
			(Total)	1.1E-05	2.3E-07	4.0E-06	1.5E-05	(Total)		2.0E-01	N/A	6.0E-02	0.26
						Total Risk Across Soil	1.5E-05					Total Hazard Index Across All Media and All Exposure Routes	0.26
						Total Risk Across All Media and All Exposure Routes	1.5E-05						

Total Skin HI = 0.26

Definitions: RME = reasonable maximum exposure

COPC = chemical of potential concern

N/A = Not applicable

HI = hazard index

TABLE 6-80

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

Jet Propulsion Laboratory -- Operable Unit-2

Scenario Timeframe: Current
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Soil	Discharge Point 4	Arsenic	1.2E-07	7.9E-09	7.4E-08	2.0E-07	Arsenic	skin	1.8E-02	N/A	1.1E-02	0.030
			(Total)	1.2E-07	7.9E-09	7.4E-08	2.0E-07	(Total)		1.8E-02	N/A	1.1E-02	0.030
							Total Risk Across Soil	2.0E-07					Total Hazard Index Across All Media and All Exposure Routes	0.030
							Total Risk Across All Media and All Exposure Routes	2.0E-07						

Total Skin HI = 0.030

Definitions: RME = reasonable maximum exposure

COPC = chemical of potential concern

N/A = Not applicable

HI = hazard index

TABLE 6-81

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

Jet Propulsion Laboratory -- Operable Unit-2

Scenario Timeframe: Current
Receptor Population: Commercial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Soil	Discharge Point 4	Arsenic	3.1E-07	2.0E-07	1.8E-06	2.4E-06	Arsenic	skin	1.9E-03	N/A	1.1E-02	0.013
			(Total)	3.1E-07	2.0E-07	1.8E-06	2.4E-06	(Total)		1.9E-03	N/A	1.1E-02	0.013
							Total Risk Across Soil	2.4E-06					Total Hazard Index Across All Media and All Exposure Routes	0.013
							Total Risk Across All Media and All Exposure Routes	2.4E-06						

Total Skin HI = 0.013

Definitions: RME = reasonable maximum exposure

COPC = chemical of potential concern

N/A = Not applicable

HI = hazard index

TABLE 6-82

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

Jet Propulsion Laboratory -- Operable Unit-2

Scenario Timeframe: Future
Receptor Population: On-site Resident
Receptor Age: Child/Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Soil	Waste Pit 1/ Discharge Point 1											
			Arochlor-1254	6.3E-07	1.6E-09	1.1E-06	1.8E-06	Arochlor-1254	eyes	0.13	0.00032	0.19	0.32
			Arochlor-1260	8.5E-07	2.2E-09	1.5E-06	2.4E-06	Arochlor-1260	N/A	N/A	N/A	N/A	N/A
			Arsenic	7.0E-06	1.5E-07	1.3E-05	2.0E-05	Arsenic	skin	0.13		0.19	0.32
			Chromium (VI)	1.8E-07	1.7E-06	0.0E+00	1.9E-06	Chromium (VI)	none reported	0.0036	0.012	0.0	0.0036
			(Total)	8.7E-06	1.9E-06	1.5E-05	2.6E-05	(Total)		0.26	0.012	0.38	0.65
						Total Risk Across Soil	2.6E-05					Total Hazard Index Across All Media and All Exposure Routes	0.65
						Total Risk Across All Media and All Exposure Routes	2.6E-05						

Definitions: RME = reasonable maximum exposure
COPC = chemical of potential concern
N/A = Not applicable
HI = hazard index

Total Eye HI =	0.32
Total Skin HI =	0.32

TABLE 6-83

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

Jet Propulsion Laboratory – Operable Unit-2

Scenario Timeframe: Current
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Soil	Waste Pit 1/Discharge Point 1	Arochlor-1254	6.7E-09	5.6E-11	2.1E-08	2.8E-08	Arochlor-1254	eyes	4.7E-03	9.8E-05	1.5E-02	0.019
			Arochlor-1260	9.1E-09	7.5E-11	2.8E-08	3.7E-08	Arochlor-1260	N/A	N/A	N/A	N/A	N/A
			Arsenic	7.5E-08	5.0E-09	2.4E-07	3.2E-07	Arsenic	skin	1E-02	N/A	3.7E-02	0.048
			Chromium (VI)	5.9E-09	6.0E-08	0.0E+00	6.6E-08	Chromium (VI)	none reported	5E-05	3.6E-03	N/A	0.0036
			(Total)	9.7E-08	6.5E-08	2.9E-07	4.5E-07	(Total)		1.6E-02	3.7E-03	5.1E-02	0.072
							Total Risk Across Soil	4.5E-07					Total Hazard Index Across All Media and All Exposure Routes	0.072
							Total Risk Across All Media and All Exposure Routes	4.5E-07						

Definitions: RME = reasonable maximum exposure

COPC = chemical of potential concern

N/A = Not applicable

HI = hazard index

Total Eyes HI =	0.019
Total Skin HI =	0.048

TABLE 6-84

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

Jet Propulsion Laboratory -- Operable Unit-2

Scenario Timeframe: Current
Receptor Population: Commercial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Soil	Waste Pit 1/Discharge Point 1	Arochlor-1254	1.7E-08	1.4E-09	5.2E-07	5.4E-07	Arochlor-1254	eyes	0.0012	9.8E-05	0.015	0.016
			Arochlor-1260	2.4E-08	1.9E-09	7.1E-07	7.3E-07	Arochlor-1260	N/A	N/A	N/A	N/A	N/A
			Arsenic	2.0E-07	1.3E-07	5.9E-06	6.2E-06	Arsenic	skin	0.0012	N/A	0.037	0.038
			Chromium (VI)	1.5E-08	1.5E-06	0.0E+00	1.5E-06	Chromium (VI)	none reporte	3.4E-05	0.0036	N/A	0.0036
			(Total)	2.5E-07	1.6E-06	7.1E-06	9.0E-06	(Total)		0.0025	0.0037	0.051	0.058
							Total Risk Across Soil	9.0E-06					Total Hazard Index Across All Media and All Exposure Routes	0.058
							Total Risk Across All Media and All Exposure Routes	9.0E-06						

Definitions: RME = reasonable maximum exposure

COPC = chemical of potential concern

N/A = Not applicable

HI = hazard index

Total Eyes HI = 0.016

Total Skin HI = 0.038

TABLE 6-85

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

Jet Propulsion Laboratory -- Operable Unit-2

Scenario Timeframe: Future
Receptor Population: On-site Resident
Receptor Age: Child/Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Soil	Waste Pit 4	Arsenic	1.3E-05	2.7E-07	4.7E-06	1.8E-05	Arsenic	skin	2.4E-01	N/A	7.2E-02	0.31
			(Total)	1.3E-05	2.7E-07	4.7E-06	1.8E-05	(Total)		2.4E-01	N/A	7.2E-02	0.31
							Total Risk Across Soil	1.8E-05					Total Hazard Index Across All Media and All Exposure Routes	0.31
							Total Risk Across All Media and All Exposure Routes	1.8E-05						

Total Skin HI = 0.31

Definitions: RME = reasonable maximum exposure

COPC = chemical of potential concern

N/A = Not applicable

HI = hazard index

TABLE 6-86

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

Jet Propulsion Laboratory -- Operable Unit-2

Scenario Timeframe: Current
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Soil	Waste Pit 4	Arsenic	1.4E-07	9.4E-09	8.8E-08	2.4E-07	Arsenic	skin	2.2E-02	N/A	1.4E-02	0.036
			(Total)	1.4E-07	9.4E-09	8.8E-08	2.4E-07	(Total)		2.2E-02	N/A	1.4E-02	0.036
						Total Risk Across Soil	2.4E-07					Total Hazard Index Across All Media and All Exposure Routes	0.036
						Total Risk Across All Media and All Exposure Routes	2.4E-07						

Total Skin HI = 0.036

Definitions: RME = reasonable maximum exposure

COPC = chemical of potential concern

N/A = Not applicable

HI = hazard index

TABLE 6-87

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

Jet Propulsion Laboratory -- Operable Unit-2

Scenario Timeframe: Current
Receptor Population: Commercial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Soil	Waste Pit 4	Arsenic	3.7E-07	2.3E-07	2.2E-06	2.8E-06	Arsenic	skin	2.3E-03	N/A	1.4E-02	0.016
			(Total)	3.7E-07	2.3E-07	2.2E-06	2.8E-06	(Total)		2.3E-03	N/A	1.4E-02	0.016
							Total Risk Across Soil	2.8E-06					Total Hazard Index Across All Media and All Exposure Routes	0.016
							Total Risk Across All Media and All Exposure Routes	2.8E-06						

Definitions: RME = reasonable maximum exposure

COPC = chemical of potential concern

N/A = Not applicable

HI = hazard index

Total Skin HI = 0.016

TABLE 6-88

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

Jet Propulsion Laboratory -- Operable Unit-2

Scenario Timeframe: Future
Receptor Population: On-site Resident
Receptor Age: Child/Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Soil	Dsicharge Point 3	Arsenic	1.1E-05	2.2E-07	3.8E-06	1.5E-05	--	--	--	--	--	--
			(Total)	1.1E-05	2.2E-07	3.8E-06	1.5E-05	(Total)		--	--	--	--
						Total Risk Across Soil	1.5E-05					Total Hazard Index Across All Media and All Exposure Routes	--
						Total Risk Across All Media and All Exposure Routes	1.5E-05						

Total Skin HI = --

Definitions: RME = reasonable maximum exposure

COPC = chemical of potential concern

N/A = Not applicable

HI = hazard index

TABLE 6-89

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

Jet Propulsion Laboratory – Operable Unit-2

Scenario Timeframe: Current
Receptor Population: Commercial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Soil	Discharge Point 3	Arsenic	2.9E-07	1.9E-07	1.8E-06	2.3E-06	–	–	–	–	–	–
			(Total)	2.9E-07	1.9E-07	1.8E-06	2.3E-06	(Total)		–	–	–	–
							Total Risk Across Soil	2.3E-06					Total Hazard Index Across All Media and All Exposure Routes	–
							Total Risk Across All Media and All Exposure Routes	2.3E-06						

Total Skin HI = –

Definitions: RME = reasonable maximum exposure

COPC = chemical of potential concern

N/A = Not applicable

HI = hazard index

TABLE 6-90

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

Jet Propulsion Laboratory -- Operable Unit-2

Scenario Timeframe: Future
Receptor Population: On-site Resident
Receptor Age: Child/Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Soil	Dsicharge Point 4	Arsenic	1.1E-05	2.3E-07	4.0E-06	1.5E-05	--	--	--	--	--	--
			(Total)	1.1E-05	2.3E-07	4.0E-06	1.5E-05	(Total)		--	--	--	--
						Total Risk Across Soil	1.5E-05					Total Hazard Index Across All Media and All Exposure Routes	--
						Total Risk Across All Media and All Exposure Routes	1.5E-05						

Total Skin HI = --

Definitions: RME = reasonable maximum exposure

COPC = chemical of potential concern

N/A = Not applicable

HI = hazard index

TABLE 6-91

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

Jet Propulsion Laboratory -- Operable Unit-2

Scenario Timeframe: Current
Receptor Population: Commercial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Soil	Discharge Point 4	Arsenic	3.1E-07	2.0E-07	1.8E-06	2.4E-06	--	--	--	--	--	--
			(Total)	3.1E-07	2.0E-07	1.8E-06	2.4E-06	(Total)		--	--	--	--
							Total Risk Across Soil	2.4E-06					Total Hazard Index Across All Media and All Exposure Routes	--
							Total Risk Across All Media and All Exposure Routes	2.4E-06						

Total Skin HI = --

Definitions: RME = reasonable maximum exposure

COPC = chemical of potential concern

N/A = Not applicable

HI = hazard index

TABLE 6-92

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

Jet Propulsion Laboratory – Operable Unit-2

Scenario Timeframe: Future
Receptor Population: On-site Resident
Receptor Age: Child/Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Soil	Waste Pit 1/ Discharge Point 1											
			Arochlor-1254	6.3E-07	1.6E-09	1.1E-06	1.8E-06	--	--	--	--	--	--
			Arochlor-1260	8.5E-07	2.2E-09	1.5E-06	2.4E-06	--	--	--	--	--	--
			Arsenic	7.0E-06	1.5E-07	1.3E-05	2.0E-05	--	--	--	--	--	--
			Chromium (VI)	1.8E-07	5.8E-07	0.0E+00	7.7E-07	--	--	--	--	--	--
			(Total)	8.7E-06	7.3E-07	1.5E-05	2.5E-05	(Total)		--	--	--	--
							Total Risk Across Soil	2.5E-05					Total Hazard Index Across All Media and All Exposure Routes	--
							Total Risk Across All Media and All Exposure Routes	2.5E-05						

Definitions: RME = reasonable maximum exposure
COPC = chemical of potential concern
N/A = Not applicable
HI = hazard index

Total Eye HI = --
Total Skin HI = --

TABLE 6-93

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

Jet Propulsion Laboratory -- Operable Unit-2

Scenario Timeframe: Current
Receptor Population: Commercial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Soil	Waste Pit 1/Discharge Point 1	Arochlor-1254	1.7E-08	1.4E-09	5.2E-07	5.4E-07	--	--	--	--	--	--
			Arochlor-1260	2.4E-08	1.9E-09	7.1E-07	7.3E-07	--	--	--	--	--	--
			Arsenic	2.0E-07	1.3E-07	5.9E-06	6.2E-06	--	--	--	--	--	--
			Chromium (VI)	1.5E-08	1.5E-06	0.0E+00	1.5E-06	--	--	--	--	--	--
			(Total)	2.5E-07	1.6E-06	7.1E-06	9.0E-06	(Total)		--	--	--	--
							Total Risk Across Soil	9.0E-06					Total Hazard Index Across All Media and All Exposure Routes	--
							Total Risk Across All Media and All Exposure Routes	9.0E-06					

Total Eyes HI = --

Total Skin HI = --

Definitions: RME = reasonable maximum exposure

COPC = chemical of potential concern

N/A = Not applicable

HI = hazard index

TABLE 6-94

RISK ASSESSMENT SUMMARY

REASONABLE MAXIMUM EXPOSURE

Jet Propulsion Laboratory -- Operable Unit-2

Scenario Timeframe: Future
Receptor Population: On-site Resident
Receptor Age: Child/Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Soil	Waste Pit 4	Arsenic	1.3E-05	2.7E-07	4.7E-06	1.8E-05	--	--	--	--	--	--
			(Total)	1.3E-05	2.7E-07	4.7E-06	1.8E-05	(Total)	--	--	--	--	--
							Total Risk Across Soil	1.8E-05	Total Hazard Index Across All Media and All Exposure Routes				--
							Total Risk Across All Media and All Exposure Routes	1.8E-05					

Definitions: RME = reasonable maximum exposure

-- = Chemical did not exceed target hazard levels

TABLE 6-95

RISK ASSESSMENT SUMMARY

REASONABLE MAXIMUM EXPOSURE

Jet Propulsion Laboratory -- Operable Unit-2

Scenario Timeframe: Current
Receptor Population: Commercial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Soil	Waste Pit 4	Arsenic	3.7E-07	2.3E-07	2.2E-06	2.8E-06	--	--	--	--	--	--
			(Total)	3.7E-07	2.3E-07	2.2E-06	2.8E-06	(Total)	--	--	--	--	--
							Total Risk Across Soil	2.8E-06					Total Hazard Index Across All Media and All Exposure Routes	--
							Total Risk Across All Media and All Exposure Routes	2.8E-06					

Definitions: RME = reasonable maximum exposure

-- = Chemical did not exceed target hazard levels

TABLE 6-96
COMPARISON OF SURFACE SOIL CONCENTRATIONS (0 TO 2- FOOT DEPTH) AT JPL TO ECOLOGICAL PRELIMINARY REMEDIATION GOALS AND SITE BACKGROUND VALUES

Location	Analyte	Detected Value (mg/kg)	Background Value (mg/kg)	PRG[1] (mg/kg)	Ecological Endpoint[1]	Detected Value Exceeds Benchmark and Background Value?
WP-1/DP-1	Arsenic	2.3	2.2	9.9	shrew, plant	No
(B-23A)	Barium	74.4	106	283	woodcock	No
	Beryllium	0.25	0.6	10	plant	No
	Bis(2-ethylhexyl)-phthalate[2]	0.15	N/A	200	plant	No
	Cadmium	2.3	ND[3]	4.0	plant, woodcock	No
	Chromium	12.4	12.4	0.4	earthworm	No
	Cobalt	4.6	7.0	20	plant	No
	Copper	22.7	11.5	60	earthworm	No
	Lead	71.6	6.2	40.5	woodcock	Yes
	Mercury	0.22	0.09	0.00051	woodcock	Yes
	Molybdenum	2.5	ND[4]	2.0	plant	No
	Nickel	5.0	6.9	30	plant	No
	Nitrate [8]	2.9	N/A	N/A	N/A	No
	Strontium	26.7	26.7	N/A	N/A	No
	Vanadium	22	33.7	2.0	plant	No
	Zinc	226	41.8	8.5	woodcock	Yes
WP-1/DP-1	Arochlor-1254[5]	0.2	N/A	0.371	shrew	No
(TP-2 and 2A)	Arochlor-1260[5]	0.27	N/A	0.371	shrew	No
	Arsenic	2.4	2.2	9.9	shrew, plant	No
	Barium	75.9	106	283	woodcock	No
	Benzo(a)anthracene[6]	0.0077	N/A	0.1	fauna	No
	Benzo(b)fluoranthene[6]	0.0088	N/A	0.1	fauna	No
	Benzo(g,h,i)perylene[6]	0.048	N/A	0.1	fauna	No
	Beryllium	0.26	0.6	10	plant	No
	Bis(2-ethylhexyl)-phthalate[2]	0.48	N/A	200	plant	No
	Bromodichloromethane[8]	0.0032	N/A	N/A	N/A	No
	Butylbenzyl-phthalate[2]	0.16	N/A	200	plant	No
	Cadmium	3.4	ND[3]	4	plant, woodcock	No
	Chloroform[8]	0.0052	N/A	N/A	N/A	No
	Chromium	23.9	12.4	0.4	earthworm	Yes
	Chrysene[6]	0.018	N/A	0.1	fauna	No
	Cobalt	5.9	7.0	20	plant	No
	Copper	20.1	11.5	60	earthworm	No
	Di-n-butyl-phthalate[6]	0.25	N/A	200	plant	No
	Fluoranthene[6]	0.024	N/A	0.1	plant	No
	Hexavalent chromium	0.124	ND[2]	0.4	earthworm	No
	Indeno(1,2,3cd)pyrene	0.067	N/A	0.1	plant	No
	Lead	72.1	6.2	40.5	woodcock	Yes
	Mercury	0.26	0.09	0.00051	woodcock	Yes
	Methylene chloride[8]	0.005	N/A	N/A	N/A	No
	Nickel	10.5	6.9	30	plant	No

TABLE 6-96
COMPARISON OF SURFACE SOIL CONCENTRATIONS (0 TO 2- FOOT DEPTH) AT JPL TO ECOLOGICAL PRELIMINARY REMEDIATION GOALS AND SITE BACKGROUND VALUES

Location	Analyte	Detected Value (mg/kg)	Background Value (mg/kg)	PRG[1] (mg/kg)	Ecological Endpoint[1]	Detected Value Exceeds Benchmark and Background Value?
	Nitrate [8]	18.6	N/A	N/A	N/A	No
	1,2,3,4,6,7,8,9-OCDD[7]	0.00000092	N/A	3.15E-06	shrew	No
	Phenanthrene[6]	0.012	N/A	0.1	fauna	No
	Pyrene[6]	0.055	N/A	0.1	fauna	No
	Strontium[8]	39	26.7	N/A	N/A	No
	Thallium	0.86	N/A	1	plant	No
	Tributyltin[8]	0.001	N/A	N/A	N/A	No
	Vanadium	67.6	33.7	2	plant	Yes
	Zinc	279	41.8	8.5	woodcock	Yes

Notes:

[1] Efroymson and others, 1997.
Ecological Endpoint indicates which receptor has the lowest PRG of the receptors evaluated.

[2] Benchmark value is not available, value used is for di-n-butyl phthalate because of similar chemical structure.

[3] Detection limit range for cadmium: 0.01 to 0.5 mg/kg.

[4] Detection limit range for molybdenum: 0.23 to 5.0 mg/kg.

[5] PRG based on total PCBs.

[6] EPA, 1995.

[7] OCDD benchmark value extrapolated using toxic equivalency factor for TCDD. Refer to Section 6.2.3.1 of the text.

[8] Not retained as COPC due to lack of toxicity data. Refer to Section 6.2.2.3 for qualitative evaluation.

B = Soil boring No.
mg/kg = Milligrams per kilogram.
N/A = Not applicable.
ND = Not detected.
OCDD = Octachlorodibenzo-p-dioxin.
PRG = Preliminary remediation goal.
TP = Test pit No.

TABLE 6-97
COMPARISON OF SUBSURFACE SOIL CONCENTRATIONS (2- TO 5-FOOT DEPTH) AT JPL TO ECOLOGICAL PRELIMINARY REMEDIATION GOALS AND SITE BACKGROUND VALUES

Location	Analyte	Maximum Value (mg/kg)	Background Value (mg/kg)	PRG[1] (mg/kg)	Ecological Endpoint[1]	Maximum Value Exceeds Benchmark and Background Value?
WP-1/DP-1	Arochlor-1254	0.018	N/A	0.371	shrew	No
(TP-2 and 2A)	Arochlor-1260	0.021	N/A	0.371	shrew	No
	Arsenic	3.0	2.2	9.9	shrew, plant	No
	Barium	41.3	106	283	woodcock	No
	Berylium	0.37	0.6	10	plant	No
	Bis(2-ethylhexyl)-phthalate	0.050	N/A	200	plant	No
	Cadmium	0.80	ND[3]	4	plant, woodcock	No
	Chromium	33.9	12.4	0.4	earthworm	Yes
	Cobalt	6.6	7.0	20	plant	No
	Copper	19.8	11.5	60	earthworm	No
	Hexavalent chromium	0.836	ND[2]	0.4	earthworm	No
	Lead	4.7	6.2	40.5	woodcock	No
	Mercury	0.13	0.09	0.00051	woodcock	Yes
	Methylene chloride[5]	0.003	N/A	N/A	N/A	No
	Nickel	10.1	6.9	30	plant	No
	Nitrate[5]	25.9	N/A	N/A	N/A	No
	Strontium[5]	22.2	26.7	N/A	N/A	No
	Thallium	0.67	N/A	1	plant	No
	Tributyltin [5]	0.0010	N/A	N/A	N/A	No
	Vanadium	29	33.7	2	plant	No
	Zinc	93.5	41.8	8.5	woodcock	Yes
DP-2	Arsenic	1.8	2.2	9.9	shrew, plant	No
(B-29)	Barium	79	106	283	woodcock	No
	Chromium	10.1	12.4	0.4	earthworm	No
	Cobalt	6.8	7	20	plant	No
	Copper	12.1	11.5	60	earthworm	No
	Hexavalent Chromium[3]	0.28	ND[2]	0.4	earthworm	No
	Lead	12.1	6.2	40.5	woodcock	No
	Mercury	0.21	0.09	0.00051	woodcock	Yes
	Nickel	7.2	6.9	30	plant	No
	Nitrate [5]	4.4	N/A	N/A	N/A	N/A
	Strontium[5]	32.2	26.7	N/A	N/A	Yes
	Vanadium	25.9	33.7	2	plant	No
	Zinc	45.4	41.8	8.5	woodcock	Yes
DP-3	Acetone[5]	0.0054	N/A	N/A	N/A	No
(TP-3 and 3A)	Arsenic	4.5	2.2	9.9	shrew, plant	No
	Barium	97.1	106	283	woodcock	No
	Beryllium	0.52	0.6	10	plant	No
	Benzo(a)pyrene[4]	0.0042	N/A	0.1	fauna	No
	Benzo(g,h,i)perylene[4]	0.011	N/A	0.1	fauna	No
	Chromium	18.8	12.4	0.4	earthworm	Yes
	Cobalt	10.3	7.0	20	plant	No
	Copper	18.4	11.5	60	earthworm	No
	Hexavalent Chromium[3]	0.145	ND[2]	0.4	earthworm	No
	Lead	8.4	6.2	40.5	woodcock	No
	Mercury	0.18	0.09	0.00051	woodcock	Yes
	Methylene chloroide[5]	0.004	N/A	N/A	N/A	No
	Nickel	12	6.9	30	plant	No
	Nitrate [5]	19.1	N/A	N/A	N/A	N/A
	Strontium[5]	23.4	26.7	N/A	N/A	No
	Thallium	0.79	N/A	1	plant	No
	Vanadium	44.1	33.7	2	plant	Yes
	Zinc	45.9	41.8	8.5	woodcock	Yes
DP-4	Acetone[5]	0.0063	N/A	N/A	N/A	No
(TP-1 and 1A)	Antimony	3.2	1.5	5	plant	No
	Arochlor-1232	0.033	N/A	0.371	shrew	No

TABLE 6-97
COMPARISON OF SUBSURFACE SOIL CONCENTRATIONS (2- TO 5-FOOT DEPTH) AT JPL TO ECOLOGICAL PRELIMINARY REMEDIATION GOALS AND SITE BACKGROUND VALUES

Location	Analyte	Maximum Value (mg/kg)	Background Value (mg/kg)	PRG[1] (mg/kg)	Ecological Endpoint[1]	Maximum Value Exceeds Benchmark and Background Value?
	Arsenic	4.7	2.2	9.9	shrew, plant	No
	Barium	54.7	106	283	woodcock	No
	Beryllium	0.36	0.6	10	plant	No
	Bromodichloromethane[5]	0.0029	N/A	N/A	N/A	No
	Chloroform[5]	0.0045	N/A	N/A	N/A	No
	Chromium	9.6	12.4	0.4	earthworm	No
	Cobalt	5.5	7	20	plant	No
	Copper	12.5	11.5	60	earthworm	No
	Hexavalent Chromium[3]	0.131	ND[2]	0.4	earthworm	No
	Lead	11.4	6.2	40.5	woodcock	No
	Mercury	0.3	0.09	0.00051	woodcock	Yes
	Methylene chloride[5]	0.005	N/A	N/A	N/A	No
	Nitrate [5]	19.1	N/A	N/A	N/A	No
	Strontium[5]	34.9	26.7	N/A	N/A	Yes
	Thallium	0.85	N/A	1	plant	No
	Vanadium	34.5	33.7	2	plant	Yes
	Zinc	45.9	41.8	8.5	woodcock	Yes
WP-4	Arsenic	2	2.2	9.9	shrew, plant	No
(B-30)	Barium	67	106	283	woodcock	No
	Chromium	4.1	12.4	0.4	earthworm	No
	Cobalt	5.1	7	20	plant	No
	Copper	14.7	11.5	60	earthworm	No
	Lead	3.2	6.2	40.5	woodcock	No
	Nitrate[5]	2.5	N/A	N/A	N/A	No
	Strontium[5]	17.6	26.7	N/A	N/A	No
	Vanadium	18.5	33.7	2	plant	No
	Zinc	32.9	41.8	8.5	woodcock	No
WP-5	Arsenic	1.4	2.2	9.9	shrew, plant	No
(B-31)	Barium	39.5	106	283	woodcock	No
	Chromium	4.8	12.4	0.4	earthworm	No
	Copper	6.4	11.5	60	earthworm	No
	Lead	1.6	6.2	40.5	woodcock	No
	Mercury	0.21	0.09	0.00051	woodcock	Yes
	Nitrate [5]	0.21	N/A	N/A	N/A	No
	Strontium[5]	24.3	26.7	N/A	N/A	No
	Vanadium	16.7	33.7	2	plant	No
	Zinc	22.9	41.8	8.5	woodcock	No

Notes:

[1] Efroymson and others, 1997.

Ecological Endpoint indicates which receptor has the lowest PRG of the receptors evaluated.

[2] Detection limit for hexavalent chromium is 0.2 mg/kg.

[3] Benchmark value not available, value used is for chromium.

[4] EPA, 1995.

[5] Not retained as COPC due to lack of toxicity data. Refer to Section 6.2.2.3 for a qualitative evaluation.

B = Soil boring No.

DP-2 = Discharge Point No. 2.

DP-3 = Discharge Point No.3.

DP-4 = Discharge Point No. 4.

mg/kg = Milligrams per kilogram.

N/A = Not applicable.

ND = Not detected.

PRG = Preliminary remediation goal.

TP = Test pit No.

WP-1/DP-1 = Waste Pit No. 1/Discharge Point No. 1.

WP-4 = Waste Pit No. 4.

WP-5 = Waste Pit No. 5.

TABLE 6-98
TOXICITY REFERENCE VALUES USED IN THE SCREENING-LEVEL ERA FOR THE DEER MOUSE AND AMERICAN KESTREL

Chemical	Deer Mouse (mg/kg-day)	Data Source	American Kestrel (mg/kg-day)	Data Source
Chromium	3.28	Mackenzie et al., 1958	1	Haseltine et al., 1985[1]
Lead	0.0015	EPA, 1999	0.014	U.S. Navy
Mercury	0.25	EPA, 1999	0.39	U.S. Navy
Molybdenum	0.26	Schroeder and Mitchner, 1971	3.5	Leopore and Miller, 1965
Vanadium	160	EPA, 1999	11.4	U.S. Navy
Zinc	9.6	Domingo et al., 1986	17.2	White and Dieter, 1978

Notes:

[1] Reference unpublished, as cited in Sample and others, 1996.

mg/kg-day = milligrams of chemical per kilogram of body weight per day.

TABLE 6-99
EXPOSURE FACTORS FOR ECOLOGICAL RECEPTORS EVALUATED IN THE SCREENING-LEVEL ERA AT JPL

Receptor Species	Class/Order	Trophic Level	Body Weight (kg)	Food Intake Rate (kg/d) (1)	Soil Ingestion Fraction	Exposure Area (2)	Bio-availability (3)	Intake Rate (kg/d) (4)
Deer mouse (*Peromyscus maniculatus*)	Mammalia/Rodentia	Omnivore	0.021(5)	0.00346	2%(6)	100%	100%	0.00353
American Kestrel (*Falco sparverius*)	Aves/Falconiformes	Carnivore	0.116(7)	0.0107	10.4%(8)	100%	100%	0.0118

Notes:

(1) Food intake rates are estimated from the equations presented in Nagy (1987). Units are kilograms dry weight per day.
(2) The exposure area is assumed to be equal to each location that was evaluated at the site.
(3) The unitless fraction of a chemical available to illicit an effect.
(4) Intake Rate = Food Intake Rate + Soil Ingestion Rate.
(5) EPA, 1993; average of both sexes for North America.
(6) Soil ingestion rate based on estimate for the white-footed mouse in Beyer et al. (1994).
(7) Bloom, 1973; average of both sexes, fall and winter for California
(8) Soil ingestion rate based on estimate for the American Woodcock in Beyer et al. (1994).

kg = kilograms.
kg/d = kilograms per day.

TABLE 6-100
FOOD-TO-MUSCLE TRANSFER FACTORS USED TO ESTIMATE DRY MOUSE TISSUE CONCENTRATIONS

Chemical of Potential Concern	Food-to-Muscle Transfer Factor (unitless)	Source
Chromium	3.0E-02	NCRP, 1989
Lead	8.0E-04	NCRP, 1989
Mercury	2.5E-01	Baes et al., 1984
Molybdenum	6.0E-03	Baes et al., 1984
Vanadium	2.5E-03	Baes et al., 1984
Zinc	1.0E-01	Baes et al., 1984

Notes:

1.00E-01 = $1.00 \times 10^{-1} = 0.100$.

NCRP = National Council on Radiation Protection and Measurements.

TABLE 6-101
EXPOSURE ESTIMATES AND RISK CALCULATIONS FOR THE DEER MOUSE FROM SURFACE SOILS (0 TO 2-FOOT DEPTH) AT JPL

Location	Chemical of Potential Concern	Maximum Detected Concentration (mg/kg)	Exposure Estimate (mg/kg-d)	Toxicity Reference Values[1] (mg/kg-d)	Hazard Quotient
WP-1/DP-1 *(B-23A)*	Lead	71.6	12	0.0015	8000
	Mercury	0.22	0.037	0.25	0.15
	Molybdenum	2.5	0.42	0.26	1.6
	Zinc	226	38	9.6	4.0
WP-1/DP-1 *(TP-2 and 2A)*	Chromium	23.9	4.0	3.3	1.2
	Lead	72.1	12	0.0015	8100
	Mercury	0.26	0.044	0.25	0.17
	Vanadium	67.6	11	160	0.071
	Zinc	279	47	9.6	4.9

Notes:

[1] References for toxicity reference values are cited in Table 6-98.

mg/kg = milligrams per kilogram.

mg/kg-d = milligrams of chemical per kilogram of body weight per day.

TABLE 6-102
EXPOSURE ESTIMATES AND RISK CALCULATIONS FOR THE AMERICAN KESTREL FROM SURFACE SOILS (0 TO 2-FOOT DEPTH) AT JPL

Location	Chemical of Potential Concern	Maximum Detected Concentration (mg/kg)	Dry Mouse Tissue Concentration (mg/kg)	Exposure Estimate (mg/kg-d)	Toxicity Reference Values[1] (mg/kg-d)	Hazard Quotient
WP-1/DP-1	Lead	71.6	0.18	0.70	0.014	50
(B-23A)	Mercury	0.22	0.17	0.018	0.039	0.46
	Molybdenum	2.5	0.047	0.028	3.5	0.0081
	Zinc	226	71	8.7	17.2	0.50
WP-1/DP-1	Chromium	23.9	2.2	0.44	1	0.44
(TP-2 and 2A)	Lead	72.1	0.18	0.71	0.014	51
	Mercury	0.26	0.20	0.021	0.39	0.054
	Vanadium	67.6	0.53	0.70	11.4	0.061
	Zinc	279	87	11	17.2	0.62

Notes:

[1] References for toxicity reference values are cited in Table 6-98.

mg/kg = milligrams per kilogram.

mg/kg-d = milligrams of chemical per kilogram of body weight per day.

TABLE 6-103
COMPARISON OF LEAD CONCENTRATIONS IN SURFACE SOIL AT JPL
(0 TO 2-FOOT DEPTH) TO REGIONAL BACKGROUND VALUES

Location	Analyte	Detected Value (mg/kg)	California Soils [1]		Western Conterminous United States[2]	
			Range of Data (mg/kg)	Arithmetic Mean (mg/kg)	Range of Data (mg/kg)	Arithmetic Mean (mg/kg)
WP-1/DP-1 *(B - 29)*	Lead	71.6	12--97	24	<10--700	17

Notes:

[1] Bradford and others, 1996.

[2] Shacklette and others, 1984.

B = Soil boring No.

mg/kg = milligrams per kilogram.

WP-1/DP-1 = Waste Pit No.1/Discharge Point No. 1.

TABLE 104
EXPOSURE ESTIMATES AND RISK CALCULATIONS FOR THE DEER MOUSE FROM SUBSURFACE SOILS (2- TO 5-FOOT DEPTH) AT JPL

Location	Chemical of Potential Concern	Maximum Detected Concentration (mg/kg)	Exposure Estimate (mg/kg-d)	Toxicity Reference Values[1] (mg/kg-d)	Hazard Quotient
WP-1/DP-1	Chromium	33.9	5.7	3.28	1.7
(TP-2 and 2A)	Mercury	0.13	0.022	0.25	0.087
	Zinc	93.5	16	9.60	1.6
DP-2	Mercury	0.21	0.035	0.25	0.14
(B-29)	Zinc	45.4	7.6	9.6	0.79
DP-3	Chromium	18.8	3.2	3.28	0.96
(TP-3 and 3A)	Mercury	0.18	0.030	0.25	0.12
	Vanadium	44.1	7.4	160	0.046
	Zinc	55.7	9.4	9.6	0.98
DP-4	Mercury	0.3	0.050	0.25	0.20
(TP-1 and 1A)	Vanadium	34.5	5.8	160	0.036
	Zinc	45.9	7.7	9.6	0.80
WP-5	Mercury	0.21	0.035	0.25	0.14
(B-31)					

Notes:

[1] References for toxicity reference values are cited in Table 6-98.

-- = Toxicity reference value not available; therefore, hazard quotient could not be estimated.

mg/kg = milligrams per kilogram.

mg/kg-d = milligrams of chemical per kilogram of body weight per day.

TABLE 105
EXPOSURE ESTIMATES AND RISK CALCULATIONS FOR THE AMERICAN KESTREL FROM SUBSURFACE SOILS (2- TO 5-FOOT DEPTH) AT JPL

Location	Chemical of Potential Concern	Maximum Detected Concentration (mg/kg)	Dry Mouse Tissue Concentration (mg/kg)	Exposure Estimate (mg/kg-d)	Toxicity Reference Values[1] (mg/kg-d)	Hazard Quotient
WP-1/DP-1	Chromium	33.9	3.2	0.62	1.0	0.62
(TP-2 and 2A)	Mercury	0.13	0.10	0.011	0.4	0.027
	Zinc	93.5	29	3.6	17.2	0.21
DP-2	Mercury	0.21	0.16	0.017	0.039	0.44
(B-29)	Zinc	45.4	14	1.7	17.2	0.10
DP-3	Chromium	18.8	1.8	0.34	1	0.34
(TP-3 and 3A)	Mercury	0.18	0.14	0.015	0.039	0.38
	Vanadium	44.1	0.34	0.45	11.4	0.040
	Zinc	55.7	17	2.1	17.2	0.12
DP-4	Mercury	0.3	0.23	0.024	0.039	0.63
(TP-1 and 1A)	Vanadium	34.5	0.27	0.36	11.4	0.031
	Zinc	45.9	14	1.8	17.2	0.10
WP-5	Mercury	0.21	0.16	0.017	0.039	0.44
(B-31)						

Notes:

[1] References for toxicity reference values are cited in Table 6-98.

-- = Toxicity reference value not available; therefore, hazard quotient could not be estimated.

mg/kg = milligrams per kilogram.

mg/kg-d = milligrams of chemical per kilogram of body weight per day.

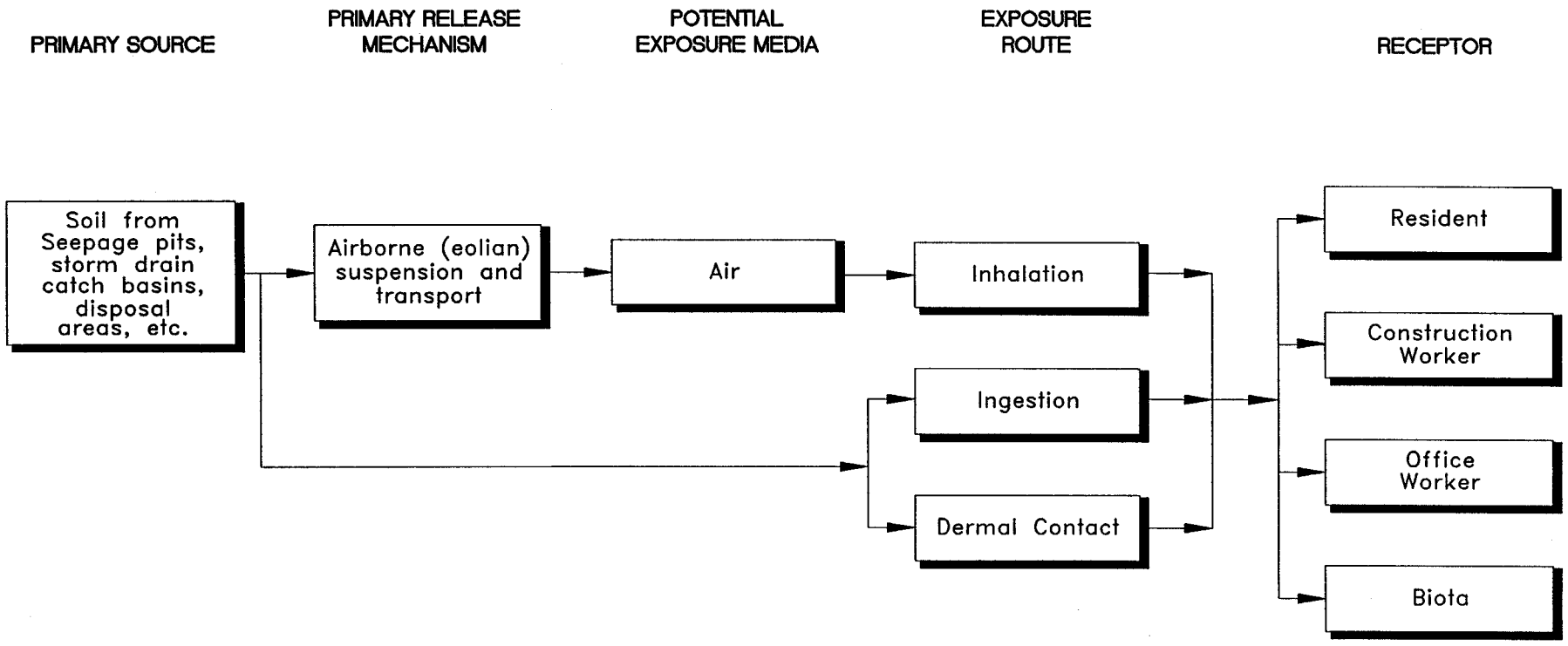


FIGURE 6-1

SITE CONCEPTUAL MODEL FOR RISK ASSESSMENT

Jet Propulsion Laboratory
Pasadena, California

FOSTER WHEELER ENVIRONMENTAL CORPORATION

BRDR6-2.DWG

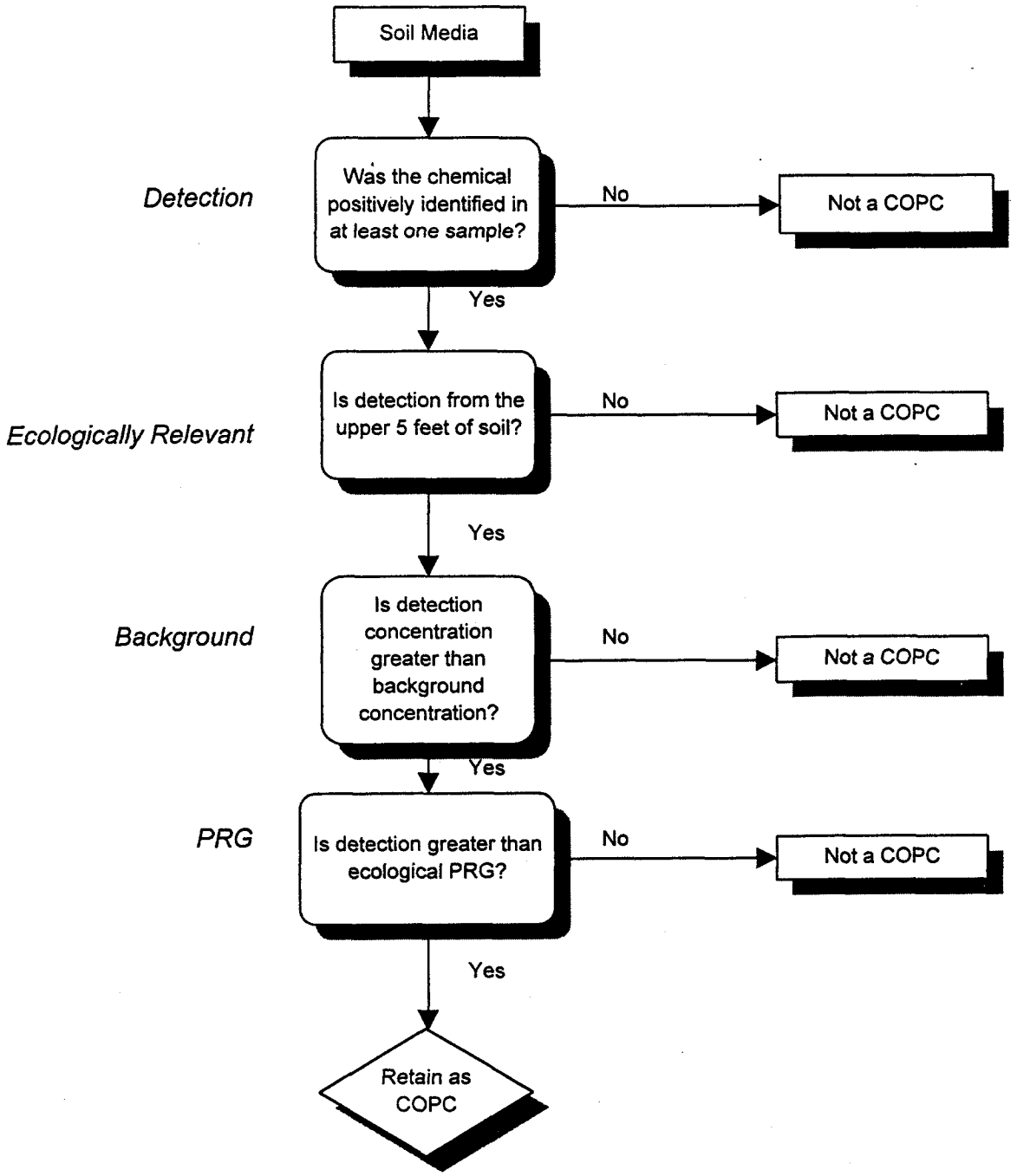


FIGURE 6-2

ECOLOGICAL CONSTITUENTS OF CONCERN SELECTION PROCESS

Jet Propulsion Laboratory
Pasadena, California

FOSTER WHEELER ENVIRONMENTAL CORPORATION

8/99

7.0 SUMMARY AND CONCLUSIONS

The OU-2 RI program at JPL was focused on assessing the nature and extent of contamination in soil and soil vapor beneath the JPL site, evaluating the fate and transport of the constituents identified, and assessing the various risks associated with potential exposure to these constituents. Detailed results of these activities are presented in the previous sections. A summary of the RI results and conclusions reached from this study is provided below.

7.1 SUMMARY

The results of the OU-2 RI conducted at JPL indicate that the soil and soil vapor have been impacted by past research and development activities at the site. Summarized in the following sections are the findings of this investigation as to the nature and extent, fate and transport, and potential risks to human receptors from contaminants of concern.

7.1.1 Nature and Extent of Contamination

For the OU-2 RI, two sources of data were used in defining the nature and extent of contamination as follows:

- Soil-vapor data consisting of results from VOC analysis of vapor samples collected from probes and soil-vapor wells.
- Soil data consisting of results from chemical analyses of soil for various organic compounds, inorganic compounds, and elements in samples collected from soil borings and test pits.

Results from soil-vapor analyses have shown that VOCs are present in the soil vapor beneath JPL. These data indicate that chlorinated aliphatic compounds and chlorofluorocarbons are the main compounds of potential concern. Four compounds, including CCl_4, Freon 113, TCE, and 1,1-DCE, were consistently present at elevated concentrations; of these, CCl_4 was the most frequently detected compound. The majority of VOC contamination, and the highest concentrations, was found beneath the central and eastern portions of the site where CCl_4 was measured at 609 µg/L-vapor in well No. 25 at a depth of 145 feet. For Freon 113, TCE, and 1,1-DCE, the highest concentrations detected were: Freon 113, 112 µg/L-vapor in well No. 32 at a depth of 135 feet; TCE, 16 µg/L-vapor in well No. 22 at depths of 60 and 80 feet; and 1,1-DCE, 24 µg/L-vapor in well No. 26 at a depth of 80 feet. Volatile organic compounds were detected at depths ranging from 20 feet below ground surface to groundwater. Detection of VOCs was infrequent in the upper portion of this range, and concentrations increased with depth in most locations. Contamination appeared, in most cases, to be related to previously identified seepage pits, waste pits, and disposal areas.

A number of non-naturally occurring analytes were detected in JPL soil samples, including SVOCs and PAHs, PCBs, dioxin, VOCs, CN^-, Cr(VI), tributyltin, and TPH. These compounds were generally detected in areas associated with past waste disposal activities. A number of naturally occurring compounds and elements were also detected including NO_3^- and As.

Only four SVOCs (excluding PAHs) were detected in the soil samples. Two of these compounds, di-n-butylphthalate and butylbenzylphthalate, were detected only in near-surface soil samples from test pit Nos. 2 and 2A (TP-2 and TP-2A); bis(2-ethylhexyl)phthalate was detected in seven soil borings (mostly at depths greater that 30 feet), and n-nitroso-di-N-propylamine was detected in one soil boring only. In samples from TP-2, bis(2-ethylhexyl)phthalate was detected at a concentration of 440 µg/kg, and di-n-butylphthalate, and butylbenzylphthalate were detected at concentrations of 250 µg/kg and 160 µg/kg, respectively. Concentrations of bis(2-ethylhexyl)phthalate ranged from 88 to 1,900 µg/kg and the concentration of n-nitroso-di-N-propylamine was 500 µg/kg.

PAHs were found in samples from two soil borings and three test pits along the southeast portion of the site that were located in areas of prior waste disposal activities. Compounds detected included benzo(b)fluoranthene, benzo(a)pyrene, benzo(g,h,i)perylene, fluoranthene, indeno (1,2,3-cd)pyrene, phenanthrene, pyrene and, benzo(a)anthracene. The highest PAH concentration measured in a soil sample was 110 µg/kg for fluoranthrene in soil boring No. 12 at a depth of 10 feet.

Two PCB congeners, Arochlor-1254 and Arochlor-1260, were detected only in samples from TP-2 at depths of 1 and 5 feet that had concentrations of 270 to 21 µg/kg, respectively. An additional congener, Arochlor-1232, was detected at a depth of 5 feet in TP-2A. Total petroleum hydrocarbons, believed to consist of lubricating or mineral oils, were detected in 14 soil borings. The highest TPH concentration of 6,500 mg/kg was from soil boring No. 1 at depth of 20 feet (tiny asphalt granules); all other detects were at least one order of magnitude lower, and most were two orders of magnitude lower. Dioxin congener 1,2,3,4,6,7,8,9-OCDD was detected only once at 9.2 µg/kg in TP-2 at a depth of 1 foot. Furans were not detected in any of the soil samples collected during the OU-2 RI field program.

Four VOC compounds (acetone, bromodichloromethane, chloroform, and methylene chloride) were detected in soil samples collected from the test pits. All concentrations reported were either equal to or less than the reporting limits, and the presence of these compounds are attributable to laboratory contamination or to runoff of facility irrigation water.

All elements included in the Title 26 Metals (plus strontium and hexavalent chromium) were detected in JPL soils with the exception of selenium. Where detected, metal concentrations typically fell within the range of levels measured in background samples of JPL soils. Arsenic was detected in samples from several locations at concentrations that ranged up to 20 mg/kg. Arsenic concentrations are within the range typically measured in California soils, and the As is believed to be naturally derived. Hexavalent Cr, which is generally not considered to occur

naturally in soils, was also detected in samples from one soil boring (No. 29) and from test pit Nos. 1A, 2A, and 3A at concentrations up to 0.84 µg/kg.

Nitrate was detected in samples from most of the soil borings, and is suspected to have resulted from agricultural and landscaping fertilizers, historic equestrian activities, irrigation waters, and past use of on-site cesspools. Cyanide was detected in samples from only one soil boring (No. 30) at concentrations ranging from 74 µg/kg to 85 µg/kg. Tributyltin was detected at the detection limit of 1 µg/kg in the two soil samples collected from test pit No. 2A. It is believed that for the purposes of assessing risk and remedial alternatives, the nature and extent of contamination have been adequately assessed.

7.1.2 Fate and Transport

The fate and transport characteristics of the constituents of interest identified in the soil and soil-vapor samples during the RI are described in Section 5.0. These constituents included VOCs in soil-vapor samples, and various SVOCs (including PAHs), two PCB congeners, one dioxin congener, TPH, As, Cr(VI), tributyltin, NO_3^-, and CN^- in soil samples.

The VOCs were generally characterized as being volatile (from soil or from water), moderately soluble in water, and moderately adsorbing to soil organic carbon. Results from the OU-2 RI, as well as the OU-1/OU-3 RI, suggests that migration of VOCs to the soil surface and discharge to the atmosphere is not likely and that vertical downward transport into groundwater has occurred, the extent and trends of which are well documented.

Semi-volatile organic compounds detected include PAHs, phthalates, and n-nitroso-di-n-propylamine. With regard to PAHs, volatilization is considered to be of minor concern. The PAHs detected in soil at JPL have low aqueous solubilities and relatively high Log(K_{ow}) values indicating that these compounds have a high potential to adsorb to the solid phase and are not expected to leach from soil into groundwater. Results from the OU-2 RI, as well as the OU-1/OU-3 RI, support this assertion since the majority of PAHs detects have been in samples collected from the upper 10 feet of soil and there is no significant evidence of their presence in groundwater.

Three phthalates and n-nitroso-di-n-propylamine were detected in soil samples collected near the surface in the vicinity of a prior waste disposal area. In general, phthalates are characterized by low solubilities, low volatilities, and moderate to high partition coefficients and are considered relatively immobile in soil-water systems. The infrequency of detects in deeper soil intervals or groundwater at JPL reflects the immobility of these compounds. N-nitroso-di-n-propylamine was detected in only one soil sample. N-nitroso-di-n-propylamine has a lower affinity for the solid phase compared to the phthalates detected, but because it was detected only once and it has not been detected in groundwater, concerns regarding this compound are minimal.

Three PCB congeners were detected in soil samples collected from two test pits at JPL. Arochlor-1254 and Arochlor-1260 were both detected in two samples from TP-2 at depths of 1 foot and 5 feet. Arochlor-1232 was detected in one sample from TP-1A at a depth of 5 feet. PCBs are characterized by very low solubilities, high log K_{ow} values, and are therefore considered relatively immobile in soil-water systems. The absence of PCBs in deeper soil and groundwater at JPL reflects their immobility. Potential migration pathways for PCBs at JPL are most likely limited to eolian transport in soil or dust particulates.

One dioxin congener was detected at a depth of 1 foot in only one sample collected from TP-2. Dioxins were not detected in any other samples collected during the RI. The absence of this compound in deeper soils and groundwater at JPL may reflect its immobility in the JPL soil-water system. Potential migration pathways for this compound are considered insignificant, and are probably limited to airborne, or eolian, transport in soil or dust particulates.

Total petroleum hydrocarbons were detected in 13 soil borings at JPL. The types of petroleum compounds believed to be present in JPL soils are generally considered to be relatively insoluble and to adsorb strongly to soil particles, which limits their mobility in the soils. In addition, their tendency to volatilize is weak, and, therefore, transfer to the atmosphere would be negligible. These compounds are potentially subject to biodegradation reactions, with the degradation rates varying based on conditions present in the soil.

Arsenic was detected in all but two soil samples collected at JPL, and its presence is believed to have resulted from naturally occurring minerals. Arsenic occurs naturally in soils in a variety of chemical forms, the behavior of which can vary based on soil conditions. Chromium was also detected in JPL soils. Two forms of chromium are found in the environment: the trivalent form, which is considered to be insoluble and immobile in soils, and the hexavalent form, which is much more soluble and can be mobilized in soils as water passes through. Hexavalent chromium, which is generally believed not to occur naturally, was detected at four locations at JPL.

Nitrate detected in JPL soils is believed to have resulted from agricultural and landscaping fertilizers, historic equestrian activities, irrigation waters, and cesspools on the site. Nitrate is readily soluble and mobile in most soil-water systems, as evidenced by its presence (at levels well below MCLs) in JPL groundwater (FWENC, 1999). Nitrate can also be reduced biologically (by soil bacteria) under anaerobic conditions to form nitrogen gas, provided a suitable carbon source is available. Tributyltin compounds are the main active ingredient in bactericides and fungicides used to control a broad spectrum of organisms in wood preservatives, marine paints, and in industrial water systems. In soil, tributyltin usually takes 1 to 3 months to degrade in aerobic conditions and more than 2 years to degrade in anaerobic conditions. Cyanide was detected in soil samples from one borehole only. Cyanide forms a variety of complexes in environmental systems with metals and organic compounds, which vary widely in terms of their chemical properties.

Migration of VOCs because of volatilization to air is expected to be of little if any significance. Although the high vapor pressures favor volatilization, the vertical distribution of VOCs in the soil indicates that movement is in the downward direction. This is supported by OU-1/OU-3 RI groundwater data that show the presence of VOCs, but these data also suggests that this process is predictable and decreasing in significance.

Erosion and subsequent eolian transport of contaminants residing in surface soil and sediment [primarily SVOCs (including PAHs), PCBs, dioxin, and metals] are considered insignificant at JPL, because concentrations are generally low, and the affected area is very limited. In addition, migration of metals and organic contaminants in surface soils and sediments to deeper soil horizons is possible, although the data does not suggest that this is a significant means of transport.

The presence of contaminants in surface soil and sediment increase the probability of migration of surface runoff mechanisms to surrounding on- and off-site receptors, especially during periods of rapid rainfall and flash flooding. However, for the reasons described in the preceding paragraph, environmental impacts associated with surface run-off are expected to be insignificant. VOCs released at seepage pits and other source areas at JPL have migrated to groundwater. However, migration of other organic compounds detected at the site to the water table is considered improbable based on the data available from OU-2 and OU-1/OU-3.

The transport of VOCs to groundwater beneath JPL has been substantiated by the presence of VOC vapors at the vadose zone-groundwater interface. In addition, Cr(VI) and As have also been detected in JPL groundwater. The presence of the Cr(VI) in groundwater is consistent with Cr(VI) in soil at the site, but occurrences in soil and groundwater are very localized. Arsenic was also detected in groundwater, but this has also occurred only in a very localized deep portion of the aquifer, and is believed to be naturally-occurring.

Migration of VOCs because of volatilization to air and into basements or buildings is expected to be of little, if any, significance. This is largely because the depth to elevated concentrations of VOCs is greater than 20 feet. Although the high vapor pressures favor volatilization, the vertical distribution of VOCs in the soil vapor indicates that overall movement is in the downward direction.

7.1.3 Risk Assessments

The baseline human health risk assessment (HHRA) and screening-level ecological risk assessment (ERA) were conducted in accordance with State of California Environmental Protection Agency DTSC guidance (DTSC, 1994) and standard EPA guidance (EPA, 1989, 1997, and 1998) on risk assessments. The purpose of the risk assessments was to focus the analytical results presented in the RI report on constituents of potential concern (COPCs), evaluate potential exposure pathways, and identify site areas potentially posing risk to human health and the environment.

7.1.3.1 Human Health Risk Assessment

Selection of Human Health Constituents of Potential Concern

The data included in the HHRA consisted of analytical results for soil samples and soil-vapor samples collected from across the site, including areas of known or suspected contamination. The data evaluated were from soil samples collected from the upper 15 feet of soil and soil-vapor samples collected from the upper 30 feet of soil. These depths were considered to be a conservative estimate of the soil to which potential receptors would most likely be exposed either through the excavation or during on-site construction activities.

A comparison of all detected concentrations to preliminary remediation goals was conducted as an initial step in conservatively identifying COPCs that should be further evaluated in the quantitative risk assessment. The maximum detected values for all chemicals positively identified in the soil and soil-vapor samples were compared to preliminary remediation goals (PRGs). PRGs were derived based on State of California (DTSC, 1994) and EPA (1989) guidance and are based on an acceptable target risk of $1x\ 10^{-6}$ for carcinogens or a hazard quotient of 1.0 for non-carcinogens. PRGs are based on a hypothetical current residential scenario as a conservative estimate of potential on-site risk, and incorporate potential exposure to on-site soils by ingestion, dermal contact, and inhalation.

In addition to the PRG comparison, a comparison to naturally occurring, or background, levels of inorganics was conducted to identify non-site-related chemicals that may be found at or near the site. All metals positively identified in the above soil samples were compared to background level concentrations. The maximum value detected in the soil samples at the site was compared to the maximum value detected in the background samples.

All organic chemicals detected at concentrations above the PRGs were considered to be preliminary COPCs. In addition, all inorganic chemicals detected at concentrations above the PRGs and above background levels were considered to be preliminary COPCs. After evaluating all of the data per the methods described above, only Arochlor-1254, Arochlor-1260, arsenic, and hexavalent chromium were identified as preliminary COPCs.

The localized occurrence of the above preliminary COPCs indicated there were five areas of concern across the entire site where contamination and risk should be further evaluated. Chemicals detected outside of these areas are below levels of concern and were eliminated from further evaluation. The five areas of concern are Waste Pit No. 1/Discharge Point No. 1 (WP-1/DP-1), Discharge Point No. 2 (DP-2), Discharge Point No. 3 (DP-3), Discharge Point No. 4 (DP-4), and Waste Pit No. 4 (WP-4).

Each area of concern was then screened against residential PRGs and background values as discussed above in order to identify COPCs for that area. Hexavalent chromium was determined to be a COPC at DP-2; Arochlor-1254, Arochlor-1260, arsenic, and hexavalent chromium were determined to be COPCs at Waste Pit No. 1/Discharge Point No. 1; and arsenic was determined

to be a COPC at Discharge Point No. 3, Discharge Point No. 4, and Waste Pit No. 4. These COPCs were quantitatively evaluated as discussed below.

Exposure Assessment

The following populations were selected to estimate risk to potential human receptors based on State of California (DTSC, 1994) and EPA (1989) guidance and recommendations:

- ***On-site child and adult residents*** – to model exposure to both children and adults under a future on-site residential exposure scenario.
- ***Commercial worker*** – to model exposure to the commercial and industrial workers that may work on site currently and in the future.
- ***Construction worker*** – to model risk to on-site workers; conservatively assumes the construction worker spends the entire time on site in a single area of concern.

The off-site resident was not included for quantitative analysis. While this may be a complete exposure pathway, the concentrations to which the off-site residents would be exposed are expected to be negligible because of wind dispersion during eolian transport.

Quantification of Exposure

Risk was quantified by using the maximum detected concentration as the exposure point concentration (DTSC, 1994). Separate non-cancer hazards and cancer risks were quantified for each potentially exposed population for each exposure scenario. For non-carcinogenic chemicals, EPA-established RfDs were used to calculate chemical-specific HQs. For carcinogenic chemicals, cancer slope factors available from the State of California and EPA were used to calculate risk.

Uncertainty Analysis

Four categories of uncertainty were evaluated in the HHRA and include the following:

- Uncertainties in environmental sampling and analysis – the HHRA conservatively assumes exposure to a single, maximum chemical concentration in soil. Individuals would more typically be exposed to a wide range of concentrations, potentially resulting in a lower average exposure. The uncertainty in the exposure point concentration was compounded by a limited sample size at each of the areas of concern. For example, the six samples collected from the WP-1/DP-1 location were analyzed for arsenic, but only four of these samples were analyzed for Arochlors.
- Uncertainties in assumptions concerning exposure scenarios – the selection of exposure pathways evaluates the most probable potentially harmful exposure scenarios. It is possible that risks are not calculated for all of the exposure pathways that may occur, which may cause some underestimation of risk.
- Uncertainties in toxicity data and dose-response extrapolations – uncertainties associated with animal and human studies can influence the classification criteria of

carcinogens based on the amount of evidence available that suggests human carcinogenicity.

- Combinations of sources of uncertainty – uncertainties from different sources are compounded in the HHRA such as uncertainties in the concentration measurements, exposure assumptions, and toxicity will all be expressed in the risk result.

Human Health Risk Assessment Results

Preliminary COPCs were identified as those organic chemicals detected at concentrations exceeding PRGs and those inorganic chemicals detected at concentrations exceeding PRGs and background concentrations. Arochlor-1254, Arochlor-1260, arsenic, and hexavalent chromium were identified as preliminary COPCs. Occurrences of these preliminary COPCs were localized in the following areas of concern: DP-2, DP-3, DP-4, WP-1/DP-1, and WP-4. Risk was quantified for these five sites. Chemicals detected outside of these areas are below levels of concern and were eliminated from further evaluation.

To ensure that human health is adequately protected, conservative concentrations, exposure parameters, and toxicity assumptions were used in estimating potential risks in accordance with State of California and EPA guidance. Theoretical risks to human health predicted by this assessment are therefore likely to be an overestimation of actual risks. For each of the exposure populations, the HQ value or cancer risk for each chemical and exposure pathway (ingestion, inhalation, and dermal) was summed to produce total non-cancer risk HI values and cancer risks. The following table presents the non-cancer HIs and cancers risks for each exposure scenario and each population evaluated for soil exposure.

	Non-Cancer Risk			Cancer Risk		
	On-Site Resident	Commercial Worker	Construction Worker	On-Site Resident	Commercial Worker	Construction Worker
Discharge Point No. 2	HI = 0.0051	HI = 0.0012	HI = 0.0012	7.7×10^{-7}	5.0×10^{-7}	2.2×10^{-8}
Discharge Point No. 3	HI = 0.25	HI = 0.013	HI = 0.029	1.5×10^{-5}	2.3×10^{-6}	1.9×10^{-7}
Discharge Point No. 4	HI = 0.26	HI = 0.013	HI = 0.030	1.5×10^{-5}	2.4×10^{-6}	2.0×10^{-7}
Waste Pit No 1/ Discharge Point No. 1	HI = 0.65	HI = 0.058	HI = 0.072	2.6×10^{-5}	9.0×10^{-6}	4.5×10^{-7}
Waste Pit No. 4	HI = 0.31	HI = 0.016	HI = 0.016	1.8×10^{-5}	2.8×10^{-6}	2.4×10^{-7}

Note:

HI — Hazard index.

The final COPC list showed that no volatile chemical detected in soil-vapor samples contributed to risk to potential human receptors based on the assumptions used for potential exposures. This conclusion is supported by the indoor air-quality sampling conducted by JPL at Building 107. This sampling was conducted in response to concerns raised by ATSDR that although VOC concentrations detected in nearby soil-vapor samples were low, vapors could collect in the lower levels of the building. The results of the indoor air-quality sampling indicated that VOC vapors were not present in Building 107 (JPL, 1998).

Discharge Point No. 2

Discharge Point No. 2 (DP-2) is located where a main north-south drainage through JPL entered the Arroyo near the southern extremities of the facility. This area historically received wastes when combustion chambers were washed down.

The final COPC list for DP-2 indicated hexavalent chromium as the only COPC for this area. Estimated risks to potential receptors in this area are below the target of HI 1.0 for non-carcinogens or below the target risk value of 1×10^{-6} for carcinogens. These results indicate that the non-carcinogenic and carcinogenic risks to potential on-site human receptors in this area are negligible. The negligible estimated risks for the on-site receptors support the exclusion of the off-site resident from the quantitative risk assessment because the relatively low exposure of the off-site resident to on-site soils will result in correspondingly lower risk estimates.

Discharge Point No. 3

Discharge Point No. 3 (DP-3) is situated south of the Southern California Edison Substation. This area historically received wastes from cooling towers that discharged into the Arroyo Seco.

The final COPC list for DP-3 indicated arsenic was the only COPC for this area. Estimated risks to potential receptors in this area are below the target HI of 1.0 for non-carcinogens or with the target risk range of $1x10^{-4}$ and $1x10^{-6}$ for carcinogens. The highest risk in this area was estimated for the hypothetical future on-site resident. This scenario is very unlikely since JPL will continue to operate as an industrial area into the foreseeable future. These results indicate that the non-carcinogenic and carcinogenic risks to potential on-site human receptors in this area are negligible. The negligible estimated risks for the on-site receptors support the exclusion of the off-site resident from the quantitative risk assessment because the relatively low exposure of the off-site resident to on-site soils will result in correspondingly lower risk estimates.

Discharge Point No. 4

Discharge Point No. 4 (DP-4) originates north of Building 103 and discharges at the Arroyo Seco bank. The discharge is believed that it may have been a petroleum derivative.

The final COPC list for DP-3 indicated arsenic was the only COPC for this area. Estimated risks to potential receptors in this area are below the target HI of 1.0 for non-carcinogens or with the target risk range of $1x10^{-4}$ and $1x10^{-6}$ for carcinogens. The highest risk in this area was estimated for the hypothetical future on-site resident. This scenario is very unlikely since JPL will continue to operate as an industrial area into the foreseeable future. These results indicate that the non-carcinogenic and carcinogenic risks to potential on-site human receptors in this area are negligible. The negligible estimated risks for the on-site receptors support the exclusion of the off-site resident from the quantitative risk assessment because the relatively low exposure of the off-site resident to on-site soils will result in correspondingly lower risk estimates.

Waste Pit No. 1/Discharge Point No. 1

Waste Pit No. 1/Discharge Point No. 1 (WP-1/DP-1) is confined to a relatively small, isolated area located along the eastern boundary of the JPL site. Discharge Point No. 1 is reported to be from a large corrugated iron pipe located south of Building 103. Waste Pit No. 1 is an erosion gully. Both have historically received wastes from the JPL site.

The final COPC list for WP-1/DP-1 included Arochlor-1254, Arochlor-1260, arsenic, and hexavalent chromium. All estimated risks for these COPCs were below the target of HI 1.0 for non-carcinogens or within the target risk range of $1x10^{-4}$ and $1x10^{-6}$ for carcinogens. The highest risk in this area was estimated for the hypothetical future on-site resident. This scenario is very unlikely since JPL will continue to operate as an industrial area into the foreseeable future. These results indicate that the non-carcinogenic and carcinogenic risks to potential on-site human receptors in this area are negligible. The negligible estimated risks for the on-site receptors support the exclusion of the off-site resident from the quantitative risk assessment because the relatively low exposure of the off-site resident to on-site soils will result in correspondingly lower risk estimates.

Waste Pit No. 4

Waste Pit No. 4 (WP-4) was a trench located in the southeast portion of the site adjacent to the Arroyo Seco. It was identified by the EPA (1993) from an aerial photograph dated November 17, 1952. Historical information about its use or contents is unavailable. It is believed that most of Waste Pit No. 4 is now covered by the parking lot along the southeast boundary of the JPL site.

The final COPC list for WP-4 included arsenic as the only COPC for this area. All estimated risks for these COPCs were below the target of HI 1.0 for non-carcinogens or within the target risk range of $1x10^{-4}$ and $1x10^{-6}$ for carcinogens. The highest risk in this area was estimated for the hypothetical future on-site resident. This scenario is very unlikely, as was mentioned above, JPL will continue to operate as an industrial area into the foreseeable future. These results indicate that the non-carcinogenic and carcinogenic risks to potential on-site human receptors in this area are negligible. The negligible estimated risks for the on-site receptors support the exclusion of the off-site resident from the quantitative risk assessment because the relatively low exposure of the off-site resident to on-site soils will result in correspondingly lower risk estimates.

7.1.3.2 Ecological Risk Assessment

Ecological Setting

JPL is located along the northern edge of the San Gabriel Valley in the central portion of Los Angeles County. The San Gabriel Valley is bounded on the north by the San Gabriel Mountains, which consist of relatively steep, rocky ridges with numerous canyons. Within the JPL site there are several habitat types including: urban landscape, chaparral, riparian, wetlands, and desert wash. The Arroyo Seco (mostly riparian and desert wash habitat) borders the east side of the site.

Species of Special Concern

The California Department of Fish and Game Natural Diversity Data Base (CDF&G, 1995) and the California Native Plant Society's list of rare, threatened, and endangered plant species (CNPS, 1994) were reviewed for species of special concern. The following species of special concern were identified as potentially occurring in the vicinity of the site:

- Southwestern arroyo toad
- Southwestern pond turtle
- San Diego horned lizard
- Peregrine falcon
- Bank swallow
- Western yellow-billed cuckoo
- Least Bell's vireo

These species have not been identified at the JPL site. Their presence on the above lists is only an indication that there may be suitable habitat within the general area.

Identification of Exposure Pathways

Ingestion was considered the primary route of exposure in this screening-level ERA. Daily activities such as burrowing, foraging, grooming, and eating may all result in exposure to COPCs through ingestion. Inhalation and dermal absorption are potential routes of exposure but are not likely to contribute significantly to the total exposure.

Selection of Ecological Constituents of Potential Concern

A COPC selection process was used to identify those chemicals that may potentially induce an adverse response in ecological receptors. The COPC selection process evaluated the following criteria: detection in site soils or soil vapor, comparison to background concentrations, and comparison to ecological PRGs.

The data included in the ERA consisted of analytical results for soil samples and soil-vapor samples collected from across the site, including areas of known or suspected contamination. The data evaluated were from soil samples collected from the upper 5 feet of soil and soil-vapor samples collected from the upper 15 of soil. These depths were considered to be protective of burrowing animals and plant roots.

A comparison of detected concentrations to preliminary remediation goals was also conducted as part of the COPC selection process. The maximum detected concentration for all chemicals positively identified in soil samples collected from the upper 5 feet of soil and in soil-vapor samples collected from the upper 15 feet of soil were compared to PRGs. PRG values were extracted primarily from *Preliminary Remediation Goals for Ecological Endpoints* (Efroymson and others, 1997) and the *Interim Ecological Risk Assessment Guidelines* (EPA, 1995).

A comparison to naturally occurring, or background, levels of inorganics was conducted to identify non-site-related chemicals that may be found at or near the site. All metals positively identified in the soil samples collected from the upper 5 feet of soil were compared to background concentrations. The maximum concentration detected in the soil samples at the site was compared to the maximum concentration detected in the background samples.

There were no organic constituents detected at concentrations above the PRGs. All inorganic chemicals detected at concentrations above PRGs and above background levels are considered to be COPCs. After evaluating the data per the methods described above, chromium, lead, mercury, molybdenum, strontium, and zinc were identified as COPCs.

Risk Characterization

The sample locations evaluated in this ERA include WP-1/DP-1, DP-2, DP-3, DP-4, WP-4, and WP-5. Lead, mercury, molybdenum, and zinc were identified as COPCs for WP-1/DP-1. Mercury and zinc were identified as COPCs for DP-2. Mercury and zinc were identified as COPCs for DP-3. Strontium, vanadium, and zinc were identified as COPCs for DP-4. No COPCs were identified for WP-4. Mercury was identified as a COPC for WP-5. All COPCs were quantitatively evaluated for the deer mouse and American kestrel.

Uncertainty

Three categories of uncertainty were evaluated in the ERA and include the following:

- Uncertainties in the exposure point concentration — this approach used the maximum detected concentration as representative of all dietary exposures. It is a very conservative approach which potentially overestimates risk, particularly for free-roaming animals that are more likely to encounter different areas of the site that possess a range of chemical concentrations.
- Uncertainties in the literature value used — uncertainty may be associated with PRGs because often only a few organisms have been studied for a chemical, a limited number of studies may have been completed, and the contaminant uptake models used in developing the PRGs do not account for soil and biota properties.
- Uncertainties due to lack of speciation of inorganic compounds — speciation affects the toxicological properties of the chemical, especially those of chromium, lead, and mercury.

Several sources of uncertainty are present in the ERA, which were addressed by the conservative approach used to estimate risk. The conservative treatment will tend to overestimate risk for potential ecological receptors.

Ecological Risk Assessment Results

The screening-level ERA was conducted using conservative criteria for potential ecological receptors. The approach is conservative because it employs conservative assumptions for each step of the process, including using PRG values and the maximum soil concentration to represent dietary intake.

Because no TRVs exist for acetone, bromodichloromethane, chloroform, methylene chloride, nitrate, strontium, or tributyltin, they were eliminated as COPCs and qualitatively evaluated relative to regional background levels and available toxicity information. On-site concentrations of strontium were found to be within published regional background levels. Acetone, bromodichloromethane, chloroform, methylene chloride, nitrate and tributyltin were detected on site at concentrations well below levels for which toxic effects have been reported. No risk due to exposure to those chemicals is expected at JPL.

Chemicals identified as COPCs include chromium, lead, mercury, vanadium, and zinc. All COPCs were quantitatively evaluated for the deer mouse and the American kestrel. Lead concentrations at WP-1/DP-1 had HQs exceeding 10 for both the deer mouse and the American kestrel. These HQs are likely overestimated because of differences in the form of lead used to derive the toxicity values (organic lead) and the likely form of lead present on-site (inorganic lead). In general, organic lead is more toxic than inorganic forms. These HQs may also be overestimated because of the conservatism of the exposure parameters used in the risk assessment. For example, it is assumed that the lead concentration in the dietary intake of the deer mouse is equal to the concentration in soil. In nature, the diet of the deer mouse is largely composed of plants and seeds, which absorb lead from soils only in limited amounts. Animals with large home ranges, such as the American kestrel, are not likely to be at risk since they would potentially obtain only a small fraction of their diet from this location. Although the HQs are elevated at this location, it is important to note that lead concentrations are within the range of background values for Californian and the western U.S. soils. Thus, potential ecological risks are likely to be lower than indicated by the estimated HQ values.

All other COPC concentrations had HQs either less than 1.0 or between 1.0 and 10 for both the deer mouse and the American kestrel. Therefore, no risk from exposure to the evaluated COPCs is expected at JPL

7.2 CONCLUSIONS

As stated at the beginning of this report, the major objectives of the OU-2 RI were as follows:

- Characterize the types of contaminants and their lateral and vertical extents in the soil at JPL.
- Provide determinations whether or not identified potential source areas could impact on-site groundwater beneath JPL.

- Provide sufficient information for the OU-2 FS to identify feasible technologies for potential remediation of the vadose zone at JPL.
- Provide sufficient information on surface soil to a depth of 2 feet to facilitate preparation of human health and ecological risk assessments.
- Provide sufficient information to facilitate preparation of an assessment on the present and future risks to public health and the environment associated with exposure to on-site soil and soil vapor.

How each of these objectives were met during the OU-2 RI are summarized below.

During the RI program, the lateral and vertical extent of contamination has been well characterized. This was accomplished through an extensive sampling and analytical program that included sampling of both soil and soil vapor at various depths from previously identified areas of potential waste disposal. Soil-vapor samples were analyzed for a comprehensive suite of VOCs, and soil samples were analyzed for SVOCs (including PAHs), PCBs, TPH, dioxins and furans, Title 26 metals plus strontium, Cr(VI), NO_3^-, CN^-. The lateral assessment covered the areas of suspected waste disposal as well as surrounding areas, the vertical extent was investigated to the water table in areas where significant soil-vapor contamination was observed.

It has been shown that a VOC-laden envelope of soil vapor (consisting of mainly CCl_4 and TCE, Freon 113, and 1,1-DCE) is located in the central and east-central portions of the site and extends to the groundwater table, but poses negligible risk. Other organics, some SVOCs, and some metals have been detected sporadically, but pose negligible risks. Based on the results of the OU-2 RI field exploration programs, sufficient information has been obtained for the screening of technologies to remediate the vadose zone.

Because the extent of VOC contamination in JPL soil vapor is adequately characterized, there are no recommendations for supplemental remedial investigations to reduce uncertainties about the physical or chemical characteristics of the soil vapor in the vadose zone beneath JPL. A complete round of sampling will be conducted in all soil-vapor wells in conjunction with a quarterly monitoring event to obtain more recent information for the purpose of identifying an appropriate remedial action.

A risk assessment has been completed, and the results show that risks to public health and the environment associated with exposure to on-site soil and soil vapor are negligible for all locations except WP-1/DP-1. Lead concentrations at this site have elevated HQs for both the deer mouse and the American kestrel. However, when uncertainties in the assessment and supplemental regional information are considered, it is likely that potential ecological risks are overestimated.

7.2.1 Data Limitations and Further Work

Because of the exploratory nature of the work performed, the most significant data limitation is the lack of temporal data to assess long-term contaminant trends. This is being addressed through the implementation of a quarterly soil vapor monitoring program, which is currently being conducted at JPL.

7.2.2 Recommended Remedial Action Objectives

Based on the nature of the soil at JPL, the volatile nature of contamination, and the depth and lateral extent of contamination, in situ soil-vapor extraction (SVE) appears to be one possible remedial technology for the VOC contaminated soils. The depth (up to 200 feet) and the wide area of impact make conventional technologies such as excavation impractical.

An extended SVE pilot test to confirm the feasibility of in situ SVE is currently being conducted in the vicinity of soil vapor well Nos. 25, 26, 27, and 28. The test will provide information for design of a full scale SVE system in terms of number of wells, screen depths, extraction flow rates, vacuums, and VOC removal rates. The test will also provide data on VOC trends in extracted vapors. Preliminary results from the pilot test indicate that SVE is a feasible remediation technology for the site. These data will be discussed more thoroughly in the OU-2 feasibility study.

8.0 REFERENCES

1. Agbabian Associates. 1977. *Seismic Studies for the Jet Propulsion Laboratory Facilities, Parts I, II, III.* Agbabian Associates. April.

2. ALS (Assembly of Life Science, Committee on Nitrite and Alternative Curing Agents in Food). 1982. *The Health Effects of Nitrate, Nitrite, and N-Nitroso Compounds.* National Academy Press. Washington D.C. July.

3. Armstrong, David M. 1987. *Rocky Mountain Mammals.* Revised Edition. Colorado Associated University Press. Boulder, Colorado.

4. ATSDR (Agency for Toxic Substances and Disease Registry). 1997. *ATSDR Toxicological Profiles on CD-ROM. US Public Health Service.* Lewis Publishers, CRC Incorporated.

5. ATSDR (Agency for Toxic Substances and Disease Registry). 1998. *Public Health for Jet Propulsion Laboratory.* U.S. Department of Health and Human Services.

6. Baes, C.F., R.D. Sharp, A.L. Sjoreen, R.W. Shor. 1984. *A Review and Analysis of Parameters for Assessing Transport of Environmentally Released Radionuclides through Agriculture.* Prepared for the U.S. Department of Energy by Oak Ridge National Laboratory.

7. Beyer, W. N., E. Conner, and S. Gerould. 1994. *Survey of Soil Ingestion by Wildlife.* J. Wildl. Mgmt. 58: pp. 375-382.

8. Bloom, P. H. 1973. *Seasonal Variation in Body Weight of Sparrow Hawks in California.* Western Bird Bander. 48: pp. 17-19.

9. Boyle Engineering. 1988. *Jet Propulsion Laboratory Facilities Master Plan.*

10. Bradford, G.R., A.C. Chang, A.L. Page, D. Bakhtar, J.A. Frampton, and H. Wright. 1996. *Background Concentrations of Trace and Major Elements in California Soils.* Special Report. Kearney Foundation of Soil Science. Division of Agriculture and Natural Resources, University of California.

11. Burkhard, L.P. and D.W. Kuehl. 1986. *N-Octanol/Water Partition Coefficients by Reverse Phase Liquid Chromatography/Mass Spectrometry for Eight Tetrachlorinated Planar Molecules.* Chemosphere, 15(2): pp. 163-167.

12. CDF&G (California Department of Fish and Game). 1995. *Natural Diversity Data Base.* September.

13. CDM (Camp, Dresser and McKee). 1990. *Environmental Resources Document for the Jet Propulsion Laboratory.* December.

14. CNPS (California Native Plant Society). 1994. *California Native Plant Society Inventory of Rare and Endangered Vascular Plants of California.* Edited by Mark W. Skinner and Bruce M. Paulik. Sacramento.

15. COEHHA (California Office of Environmental Health Hazard Assessment). 1994. *California Cancer Potency Factors: Update.* November.

16. Conner, J.R. 1990. *Chemical Fixation and Solidification of Hazardous Wastes.* Van Nostrand Reinhold. New York. pp. 173-175.

17. Converse, Davis and Associates. 1971. *Geologic Investigations of the Jet Propulsion Laboratory, Pasadena, California. Project Number 71-222-H.*

18. Crandall and Associates. 1977a. *Report of Subsurface Investigation, Overall Investigation of Geology, Soils and Seismic Hazard, Seismic Safety Plan, Jet Propulsion Laboratory Site, Pasadena, California.* LeRoy Crandall and Associates. January.

19. Crandall and Associates. 1977b. *Report of Fault Hazard Study, Jet Propulsion Laboratory, Pasadena, California.* LeRoy Crandall and Associates. January.

20. Crandall and Associates. 1981. *Dewatering Well System, Building 150, Jet Propulsion Laboratory, Pasadena, California.* LeRoy Crandall and Associates. May.

21. Dibblee, T.W., Jr. 1982. *Geology of the San Gabriel Mountains, Southern California* in *Geology and Mineral Wealth of the California Transverse Ranges.* (D.L. Fife and J.A. Minch, editors). South Coast Geological Society. pp. 131-147.

22. Domingo, J. L., J. L. Paternain, J. M. Llobet, and J. Corbella. 1986. *Effects of Vanadium on Reproduction, Gestation, Parturition and Lactation in Rats upon Oral Administration.* Life Sci. 39: pp. 819-824.

23. DTSC (California Department of Toxic Substances Control). 1992. *Supplemental Guidance for Human Health Multimedia Risk Assessments of Hazardous Waste and Permitted Facilities.* July.

24. DTSC (California Department of Toxic Substances Control). 1994. *Preliminary Endangerment Assessment Guidance Manual.* January.

25. DTSC (California Department of Toxic Substances Control). 1996a. *Guidance for Ecological Risk Assessment at Hazardous Wastes Sites and Permitted Facilities. Part A: Overview.* July.

26. DTSC (California Department of Toxic Substances Control). 1996b. *Guidance for Ecological Risk Assessment at Hazardous Wastes Sites and Permitted Facilities. Part B: Scoping Assessment.* July.

27. DTSC (California Department of Toxic Substances Control). 1997. *Selecting Inorganic Constituents as Chemicals of Potential Concern at Risk Assessments at Hazardous Waste Sites and Permitted Facilities.* Final Policy. California Environmental Protection Agency.

28. DWR (California Department of Water Resources). 1969. *Stratigraphy of the Raymond Basin Area.*

29. DWR (California Department of Water Resources). 1991. *California Well Standards: Bulletin 74-90.* (Supplement to Bulletin 74-81). California Department of Water Resources. June, 1990. 174 pp.

30. Ebasco (Ebasco Services Incorporated). 1988a. *Preliminary Assessment Report for NASA-Jet Propulsion Laboratory, Pasadena, California.*

31. Ebasco (Ebasco Services Incorporated). 1988b. *Preliminary Site Inspection Report for NASA-Jet Propulsion Laboratory, Pasadena, California.*

32. Ebasco (Ebasco Environmental Corporation). 1990a. *Expanded Site Inspection Report for NASA - Jet Propulsion Laboratory.* May.

33. Ebasco (Ebasco Environmental Corporation). 1990b. *Supplemental Information to the Expanded Site Inspection Report on the NASA - Jet Propulsion Laboratory.* November.

34. Ebasco (Ebasco Environmental Corporation). 1991. *(Draft) Remedial Investigation/ Feasibility Study Work Plan for NASA-Jet Propulsion Laboratory.* January.

35. Ebasco (Ebasco Environmental Corporation). 1993a. *Final Work Plan for Performing a Remedial Investigation/Feasibility Study at the NASA - Jet Propulsion Laboratory.* June.

36. Ebasco (Ebasco Environmental Corporation). 1993b. *Contaminant Source Research (1990 to Present)* in *Final Work Plan for Performing a Remedial Investigation/Feasibility Study at the NASA-Jet Propulsion Laboratory.* December.

37. Ebasco (Ebasco Environmental Corporation). 1993c. *Pre-RI Investigation* in *Final Work Plan for Performing a Remedial Investigation/Feasibility Study at the NASA-Jet Propulsion Laboratory.* December.

38. Ebasco (Ebasco Environmental Corporation). 1993d. *Final Field Sampling and Analysis Plan for Performing a Remedial Investigation at Operable Unit 2: Potential On-Site Contaminant Source Areas, NASA-Jet Propulsion Laboratory.* December.

39. Ebasco (Ebasco Environmental Corporation). 1993e. *Quality Assurance Program for Performing a Remedial Investigation for the NASA-Jet Propulsion Laboratory.* December.

40. Ebasco (Ebasco Environmental Corporation). 1993f. *Final Health and Safety Plan, Remedial Investigation.* December.

41. Eisler, Ronald. 1988. *Lead Hazards to Fish, Wildlife, and Invertebrates: A Synoptic Review.* United States Fish and Wildlife Service. Biological Report 85(1.14). Contaminant Hazard Reviews.

42. EPA (U.S. Environmental Protection Agency). 1986a. *Test Methods for Evaluating Solid Waste, SW-846, 3rd Edition.* USEPA Office of Solid Waste and Emergency Response. Washington D.C.

43. EPA (U.S. Environmental Protection Agency). 1986b. *90-day Gavage Study in Albino Rats Using Acetone*. Office of Solid Waste, Washington, D.C.

44. EPA (U.S. Environmental Protection Agency). 1989. *Risk Assessment Guidance for Superfund: Volume I – Human Health Evaluation Manual (Part A).* Interim Final. Office of Emergency and Remedial Response, EPA/540/1-89/002. December.

45. EPA (U.S. Environmental Protection Agency). 1991a. *Risk Assessment Guidance for Superfund: Volume 1 Human Health Evaluation Manual (Part B) Interim.* Office of Emergency and Remedial Response, EPA/540/R-92/003. January.

46. EPA (U.S. Environmental Protection Agency). 1991b. *Risk Assessment Guidance for Superfund: Volume I – Human Health Evaluation Manual. Supplemental Guidance "Standard Default Exposure Factors".* Office of Emergency and Remedial Response. OSWER Directive 9285.3-03. March.

47. EPA (U.S. Environmental Protection Agency). 1991c. *Management of Investigation-Derived Wastes During Site Inspections:* Office of Research and Development, EPA/540/ G-91/009. May.

48. EPA (U.S. Environmental Protection Agency). 1992a. *Guide to Management of Investigation-Derived Wastes*: EPA Office of Solid Waste and Emergency Response. Publication 9345.3-03FS. April.

49. EPA (U.S. Environmental Protection Agency). 1992b. *Dermal Exposure Assessment: Principles and Applications, Interim Report.* Office of Health and Environmental Assessment. EPA 600/8-91-OHB.

50. EPA (U.S. Environmental Protection Agency). 1993a. *Aerial Photographic Analysis of the NASA-Jet Propulsion Laboratory, Pasadena, California.* Environmental Monitoring Systems Laboratory, Las Vegas, Nevada. February.

51. EPA (U.S. Environmental Protection Agency). 1993b. *Wildlife Exposure Factors Handbook.* Office of Reasearch and Development. Washington, D.C. EPA/600/R-93/187a.

52. EPA (U.S. Environmental Protection Agency). 1994a. *USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review.* February.

53. EPA (U.S. Environmental Protection Agency). 1994b. *USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review.* February.

54. EPA (U.S. Environmental Protection Agency). 1995. *Supplemental Guidance to RAGS: Region 4 Bulletins.* Human Health Risk Assessment Bulletin No. 1. November.

55. EPA (U.S. Environmental Protection Agency). 1995a. *Interim Ecological Risk Assessment Guidelines (BTAG Values).* Region III.

56. EPA (U.S. Environmental Protection Agency). 1996. *Soil Screening Guidance: Technical Background Document.* Office of Emergency and Remedial Response. EPA/540/R-95/128.

57. EPA (U.S. Environmental Protection Agency). 1997. *Health Effects Assessments Summary Tables (HEAST)*. Solid Waste and Emergency Response. EPA 540/R-97/036. July.

58. EPA (U.S. Environmental Protection Agency). 1997a. *Ecological Risk Assessment Guidance for Superfund: Process for designing and Conducting Ecological Risk Assessments. Interim Final.* June.

59. EPA (U.S. Environmental Protection Agency). 1998a. *Integrated Risk Information System (IRIS).* On-line database.

60. EPA (U.S. Environmental Protection Agency). 1998b. *Risk Assessment Guidance for Superfund: Volume 1 Human Health Evaluation Manual (Part D) Interim.* Office of Emergency and Remedial Response, EPA/540/R-97/033. January.

61. EPA (U.S. Environmental Protection Agency). 1998c. *Region 9 Preliminary Remediation Goals*. November.

62. Efroymson, R.A., and others. 1997. *Preliminary Remediation Goals for Ecological Endpoints*. Prepared for United States Department of Energy by Oak Ridge National Laboratory. August.

63. ERG (Eastern Research Group, Inc.). 1998. *Report from the Workshop on the Application of 2,3,7,8-TCDD Toxicity Equivalency Factors to Fish and Wildlife.* Chicago, Illinois. March.

64. EXTOXNET. 1999. *Extension Toxicology Network Pesticide Information Profiles*. Oregon State University.

65. FWENC (Foster Wheeler Environmental Corporation). 1996a. *Draft-Final "Part A" Addendum to the Work Plan for Performing a Remedial Investigation/Feasibility Study.* September.

66. FWENC (Foster Wheeler Environmental Corporation). 1996b. *Draft-Final "Part B" Addendum to the Work Plan for Performing a Remedial Investigation/Feasibility Study.* September.

67. FWENC (Foster Wheeler Environmental Corporation). 1996c. *Draft-Final "Part A" Addendum to the Field Sampling and Analysis Plan (FSAP) for Performing a Remedial Investigation at Operable Unit 2: Potential On-Site Contaminant Source Areas*. September.

68. FWENC (Foster Wheeler Environmental Corporation). 1996d. *Draft-Final "Part B" Addendum to the Field Sampling and Analysis Plan (FSAP) for Performing a Remedial Investigation at Operable Unit 2: Potential On-Site Contaminant Source Areas.* September.

69. FWENC (Foster Wheeler Environmental Corporation). 1996e. *Draft-Final Addendum to the Quality Assurance Program for Performing a Remedial Investigation*. September.

70. FWENC (Foster Wheeler Environmental Corporation). 1998a. *Draft-Final Addendum Number 2 to the Work Plan for Performing a Remedial Investigation/Feasibility Study.* May.

71. FWENC (Foster Wheeler Environmental Corporation). 1998b. *Draft-Final Addendum Number 2 to the Field Sampling and Analysis Plan (FSAP) for Performing a Remedial Investigation at Operable Unit 2: Potential On-Site Contaminant Source Areas.* May.

72. FWENC (Foster Wheeler Environmental Corporation). 1999. *Final Remedial Investigation Report for Operable Units 1 and 3: On-Site and Off-Site Groundwater.* Volume 1. August.

73. Haseltine, S. D., L. Sileo, D. J. Hoffman, and B. D. Mulhern. 1985. *Effects of Chromium on Reproduction and Growth in Black Ducks* in *Toxicological Benchmarks for Wildlife: 1996 Revision.* Sample, B. E., et al. 1996.

74. Hem, J.D. 1985. *Study and Interpretation of the Chemical Characteristics of Natural Water:* U.S. Geological Survey, Water-Supply Paper 2254.

75. Howard, P.H. 1990. *Handbook of Environmental Fate and Exposure Data for Organic Chemicals Volume I – Large Production and Priority Pollutants.* Lewis Publishers, Inc. Chelsea, Michigan.

76. IAEA (International Atomic Energy Agency). 1994. *Handbook of Parameter Values for the Prediction of Radionuclide Transfer in Temperate Environments.* Technical Report Series No. 364, Vienna, Austria.

77. JPL (Jet Propulsion Laboratory). 1990. Untitled set of memoranda, laboratory analyses, notes, sketches, and other correspondence associated with the removal of storm drain catch basin and associated impacted soil.

78. JPL (Jet Propulsion Laboratory). 1996. *RPM Consensus Statement on RI Addenda, November 22, 1996.* Statement signed by all RPMs considering Draft-Final Addenda to Work Plan, FSAPs, and QAPP Final pursuant to changes referenced in statement.

79. JPL (Jet Propulsion Laboratory). 1998. Results of air-quality sampling conducted in Building 107 at Jet Propulsion Laboratory on May 13 and 14, 1998, for the purposes of Superfund documentation.

80. Lepore, P. D. and R. F. Miller. 1965. *Embryonic Viability as Influenced by Excess Molybdenum in Chicken Breeder Diets.* Proc. Soc. Exp. Biol. Med. 118: pp. 155-157.

81. Losi, M.E., C. Amrhein, and W.T. Frankenberger, Jr. 1994. *Environmental Biochemistry of Chromium.* Reviews of Environmental Contamination and Toxicology. Springer-Verlag, Inc., New York. 136: pp. 91-129.

82. Mabey, W.R., J.H. Smith, R.T. Podoll, H.L. Johnson, T. Mill, T.W. Chou, J. Gates, I.W. Partridge, H. Jaber, and D. Vandenberg. 1982. *Aquatic Fate Process Data for Organic Priority Pollutants. SRI International.* EPA 440/4-81-014.

83. Mackenzie, R. D., R. U. Byerrum, C. F. Decker, C. A. Hoppert, and R. F. Langham. 1958. *Chronic Toxicity Studies, II. Hexavalent and Trivalent Chromium Administered in Drinking Water to Rats*. Am. Med. Assoc. Arch. Ind. Health. 18: pp. 232-234.

84. Maness Environmental Services, Inc. 1992. *Environmental Site Investigation and Soil Remediation, Jet Propulsion Laboratory, Pasadena, California.* October.

85. Masscheleyn, P.H., R.D. Delaune, and W.H. Patrick, Jr. 1991. *Arsenic and Selenium Chemistry as Affected by Sediment Redox Potential and pH.* Journal of Environmental Quality, 20: pp. 522-527.

86. Micromedex, Incorporated. 1997. *Tomes Database*. Hazardous Substance Data Bank (HSDB). Boulder, Colorado.

87. Moore, J.W. and S. Ramamoorthy. 1984. *Heavy Metals in Natural Waters*. Springer-Verlag. New York, New York.

88. Nagy, K. A. 1987. *Field Metabolic Rate and Food Requirement Scaling in Mammals and Birds.* Ecol. Monogr. 57: pp. 111-128.

89. NCA (National Coffee Association). 1982. *24-month Chronic Toxicity and Oncogenicity Study of Methylene Chloride in Rats*. Final Report. Hazelton Laboratories, Inc., Vienna, Virginia.

90. NCRP (National Council on Radiation Protection and Measurements). 1989. Screening Techniques for Determining Compliance with Environmental Standards: Releases of Radionuclides to the Atmosphere. NCRP Commentary No. 3, Revision of January 1989. Bethesda, Maryland.

91. NTP (National Toxicology Program). 1987. *NTP Technical Report on the Toxicology and Carcinogenesis Studies of Bromodichloromethane (CAS No. 75-27-4 in F344/N Rats and B6C3F1 Mice (Gavage Studies)*. NTP Tech. Report Series No. 321. U.S. Department of Health and Human Services, Public Health Service, National Institute of Health.

92. Oral Communication. 1998a. Dan Stralka. Toxicologist, U.S. Environmental Protection Agency, Region IX. October 28.

93. Oral Communication. 1998b. Yugal Luthra. Program Toxicologist, Department of Toxic Substances Control. November 10.

94. Palausky, J., S. Kapila, S.E. Manahan, A.F. Yanders, R.K. Malhotra, and T.E. Clevenger. 1986. *Studies on Vapor Phase Transport and Role of Dispersing Medium on Mobility of 2,3,7,8-TCDD in Soil.* Chemosphere, 15: pp. 1387-1396.

95. Palmer, A.K., A.E. Street, F.J.C. Roe, A.N. Worden, and N.J. Van Abbe. 1979. *Safety Evaluation of Toothpaste Containing Chloroform, II. Long-Term Studies in Rats.* Jour. Environ. Pathol. Toxicl. 2: pp. 821-833.

96. RWQBC (California Regional Water Quality Control Board, Los Angeles Region). 1992. *Work Plan Requirements for Active Soil Gas Investigation, Well Installation Program (WIP).* November.

97. RWQBC (California Regional Water Quality Control Board, Los Angeles Region). 1996. *Interim Site Assessment and Cleanup Guidebook.* May.

98. Sample, B.E. and G.W. Suter II. 1994. *Estimating Exposure of Terrestrial Wildlife to Contaminants.* Oak Ridge National Laboratory, Oak Ridge, TN. ES/ER/TM-125. September.

99. Sample, B.E., D.M. Opresko, and G.W. Suter II. 1996. *Toxicological Benchmarks for Wildlife: 1996 Revision.* Oak Ridge National Laboratory, Oak Ridge, TN. ES/ER/TM-86/R3. June.

100. Schroeder, H. A. and M. Mitchner. 1971. *Toxic Effects of Trace Elements on the Reproduction of Mice and Rats.* Arch. Environ. Health. 23: pp. 102-106.

101. Shacklette, H.T. and J.G. Boerngen. 1984. *Element Concentrations in Soils and Other Surficial Materials of the Conterminous United States.* U.S. Geological Survey Professional Paper 1270.

102. Slade, R.C. 1984. *Preliminary Hydrogeologic Assessment of Soil and Groundwater Monitoring at Jet Propulsion Laboratory, Pasadena, California.*

103. Smith, D.P. 1986. *Geology of the North Half of the Pasadena Quadrangle, Los Angeles County, California.* California Division of Mines and Geology Open File Report 86-4 LA.

104. USACE (U.S. Army Corps of Engineers). 1996. *Risk Assessment Handbook Vol. II: Environmental Evaluation.*

105. U.S. Navy. (Undated). *Technical Memorandum: Development of Toxicity Reference Values as Part of a Regional Approach for Conducting Ecological Risk Assessments at Naval Facilities in California (Draft).* NFEC, 900 Commodore Dr., San Bruno, California, 94066-5006.

106. White, D. H. and M. P. Dieter. 1978. *Effects of Dietary Vanadium in Mallard Ducks.* Jour. Toxicol. Environ. Health. 4: pp. 43-50.

107. WHO (World Health Organization). 1997. *Draft Report on the Meeting on the Derivation of Toxic Equivalency Factors (TEFs) for PCBs, PCDDs, PCDFs and other Dioxin-like Compounds for Humans and Wildlife.* Stockholm, Sweden. June 15-18.

FOSTER WHEELER ENVIRONMENTAL CORPORATION

FINAL

REMEDIAL INVESTIGATION REPORT FOR OPERABLE UNIT 2: POTENTIAL ON-SITE CONTAMINANT SOURCE AREAS

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
JET PROPULSION LABORATORY
4800 Oak Grove Drive
Pasadena, California 91109

VOLUME II
APPENDICES

FINAL

REMEDIAL INVESTIGATION REPORT

FOR

OPERABLE UNIT 2: POTENTIAL ON-SITE CONTAMINANT SOURCE AREAS

AT THE

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
JET PROPULSION LABORATORY
4800 Oak Grove Drive
Pasadena, California 91109

Prepared by

FOSTER WHEELER ENVIRONMENTAL CORPORATION
611 Anton Boulevard, Suite 800
Costa Mesa, California 92626

November, 1999

TABLE OF CONTENTS

APPENDIX A

A1 - SOIL BORING LOGS

A2 - TEST PIT LOGS

A3 - SOIL VAPOR WELL CONSTRUCTION DIAGRAMS

APPENDIX A1

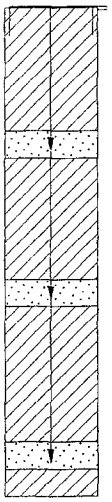
SOIL BORING LOGS

FOSTER WHEELER ENVIRONMENTAL CORPORATION

B-1

PROJECT *Jet Propulsion Laboratory*
LOCATION *Seepage Pit No. 2*
GEOLOGIST *R. Tweidt*
DRILLING CO *Beylik Drilling*
DATE (start/finish) *8-29-94 / 8-30-94*

DRILLING METHOD *Percussion Hammer*
SAMPLING METHOD *2 1/2-inch split-spoon*
SURFACE ELEVATION *1124.5 Feet*
TOTAL DEPTH (ft) *38*
DEPTH TO WATER (ft) *Not Encountered*

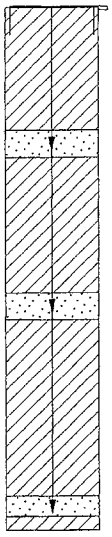
Depth (ft)	Soil-Vapor Well Completion	Sample No.	Samples	% Recovery	OVA (ppm) Drill Pipe	OVA (ppm) Sample	OVA (ppm) Breath Zn	Lithology	USCS Symbol	Lithologic Description and Notes
0									Fill	ASPHALT pavement (3 inches thick). RUBBLE FILL - Mixture of silty sand, medium sand, sandy gravel, and gravel; pale brown to orange brown to dark gray, dry to very moist, *medium dense.*
10				30	0	0	0			Dark gray medium sand, slighily moist.
20		VPSS-1		70	0	4	0		SM	*Occasional pea-sized asphalt fragments from 17' to 21'.* Silty fine to medium sand, dark gray-brown mottled with black specks, moist, dense. SILTY SAND - Fine to medium sand with trace coarse sand and fine gravel, yellowish-brown, slightly moist, medium dense, micaceous.
30				10	0	-	0			Granitic and dioritic rock fragments. *Granitic boulder from 35' to 37'.*
40		VPSS-2		100	0	2	0			Silty fine to medium sand (with granitic rock fragments and piece of galvanized electrical fitting in upper part of sampler barrel) dark orange-brown, very moist, dense, micaceous. In capillary fringe; terminate boring.
50										
60										
70										
80										
90										
100										

FOSTER WHEELER ENVIRONMENTAL CORPORATION

B-2

PROJECT *Jet Propulsion Laboratory*
LOCATION *Seepage Pit No. 3*
GEOLOGIST *R. Tweidt*
DRILLING CO *Beylik Drilling*
DATE (start/finish) *8-30-94 / 8-30-94*

DRILLING METHOD *Percussion Hammer*
SAMPLING METHOD *2 1/2-inch split-spoon*
SURFACE ELEVATION *1126.2 Feet*
TOTAL DEPTH (ft) *38.5*
DEPTH TO WATER (ft) *Not Encountered*

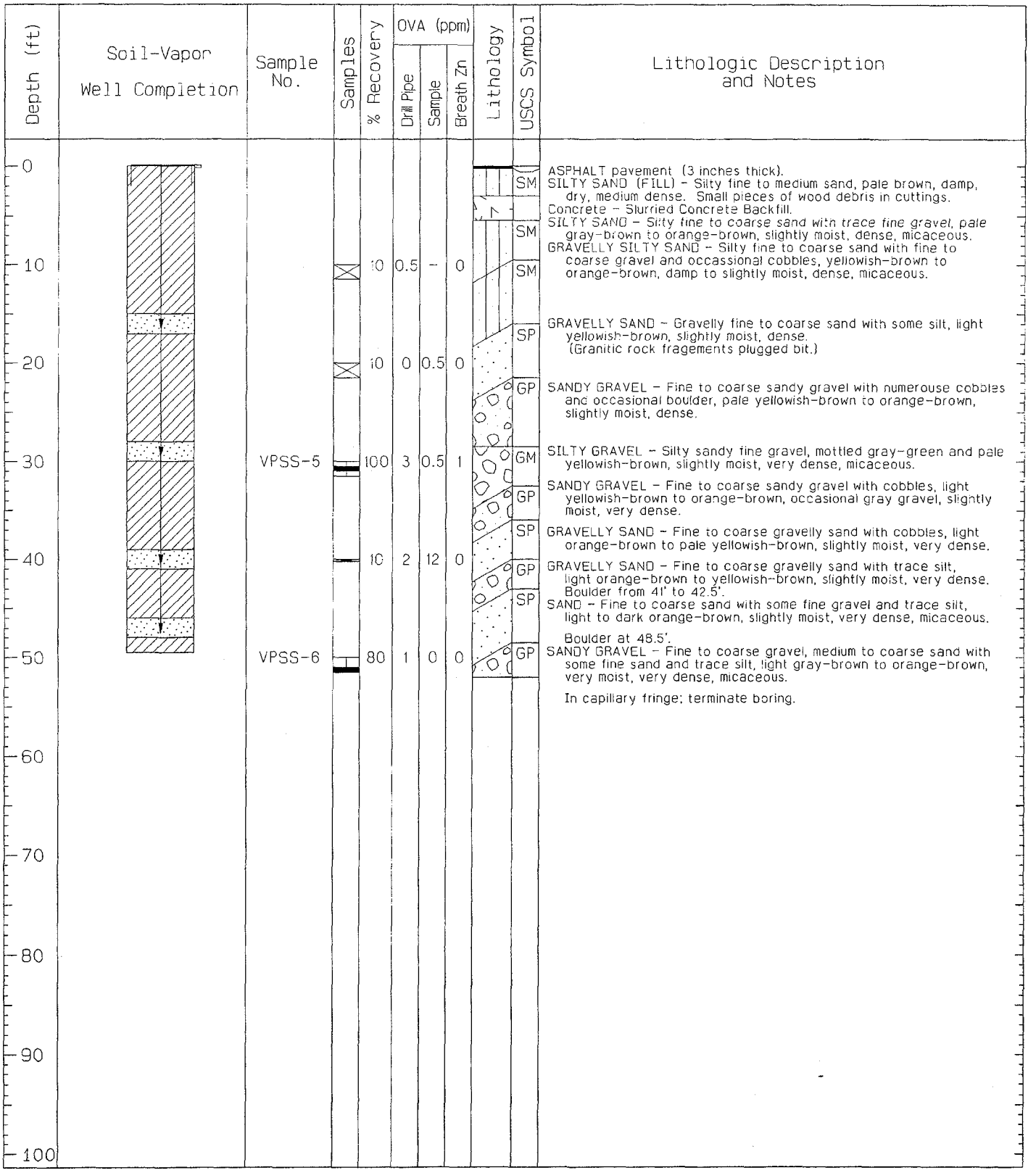
Depth (ft)	Soil-Vapor Well Completion	Sample No.	Samples	% Recovery	OVA (ppm) Drill Pipe	OVA (ppm) Sample	OVA (ppm) Breath Zn	Lithology	USCS Symbol	Lithologic Description and Notes
0									SM	ASPHALT pavement (3 inches thick). SILTY SAND - Fine to medium sand with some fine gravel, dark yellowish-brown, slightly moist, medium dense.
10		VPSS-3		100	0	60	0			
20				0	0	-	0			(Lost sample during retrieval.) Fine to medium with some coarse sand, fine to coarse gravel and small cobbles, orange-brown, moist, micaceous.
30				0	0	-	0			(Granitic rock plugged-off bit.)
40		VPSS-4		100	2	1	0			Fine to medium sand with traces of silt, coarse sand, and fine gravel, dark orange-brown, very moist. In capillary fringe; terminate boring.
50										
60										
70										
80										
90										
100										

FOSTER WHEELER ENVIRONMENTAL CORPORATION

B-3

PROJECT *Jet Propulsion Laboratory*
LOCATION *Seepage Pit No. 36*
GEOLOGIST *R. Tweidt & B.G. Randolph*
DRILLING CO *Beylik Drilling*
DATE (start/finish) *8-31-94 / 9-1-94*

DRILLING METHOD *Percussion Hammer*
SAMPLING METHOD *2 1/2-inch split-spoon*
SURFACE ELEVATION *1133.9 Feet*
TOTAL DEPTH (ft) *52*
DEPTH TO WATER (ft) *Not Encountered*



FOSTER WHEELER ENVIRONMENTAL CORPORATION

B-4

PROJECT *Jet Propulsion Laboratory*
LOCATION *Seepage Pit No. 29*
GEOLOGIST *R. Tweidt*
DRILLING CO *Beylik Drilling*
DATE (start/finish) *9/2/94 to 9/2/94*

DRILLING METHOD *Percussion Hammer*
SAMPLING METHOD *2 1/2-inch split-spoon*
SURFACE ELEVATION *1137.6 Feet*
TOTAL DEPTH (ft) *60.5*
DEPTH TO WATER (ft) *Not Encountered*

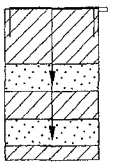
Depth (ft)	Soil-Vapor Well Completion	Sample No.	Samples	% Recovery	OVA (ppm) Drill Pipe	OVA (ppm) Sample	OVA (ppm) Breath Zn	Lithology	USCS Symbol	Lithologic Description and Notes
0									SP	ASPHALT pavement (3 inches thick). GRAVELLY SAND (FILL) - Fine to coarse gravelly, fine to medium sand with trace silt, orange-brown, damp to slightly moist, dense, micaceous. Occasional small fragments of red brick from 4.5' to 8'.
10		VPSS-7		100	1	0	0		GP	SANDY GRAVEL - Fine to coarse sandy gravel with occasional cobbles and trace silt, mottled gray-brown and orange-brown, slightly moist, very dense.
									SP	GRAVELLY SAND - Gravelly fine to coarse sand with cobbles, light orange brown to pale yellow-brown, slightly moist, dense.
20		VPSS-8		100	1	2	0		GP	SANDY GRAVEL - Fine to coarse sandy gravel with some silt and occasional cobble or decomposed granitic boulder, gray-brown and light to dark orange-brown, slightly moist, dense. Numerous cobbles and small boulders from 25' to 34'.
30				0	2	-	0			
		VPSS-9		100	1.5	2	0		SP	SAND - Fine to coarse sand with some silt and occasional fine gravel, orange-brown, slightly moist, dense, micaceous.
40		VPSS-10		100	2	0.5	0			Alternating thin lenses light gray-brown fine sand and dark orange-brown fine to coarse sand with some silt and fine gravel, moist, very dense, micaceous. Occassional cobbles and coarse gravel from 43' to 48'.
50		VPSS-11		100	4.5	0.5	0			Fine to coarse sand with occasional pieces fine gravel, orange-brown, slightly moist, trace mica.
									GP	SANDY GRAVEL AND GRAVELLY SAND - Alternating thin lenses fine to coarse sandy fine to coarse gravel and gravelly fine to coarse sand with some silt, very moist to wet, very dense, micaceous.
60		VPSS-12		100	0	0	0			In Capillary fringe; terminate boring.
70										
80										
90										
100										

FOSTER WHEELER ENVIRONMENTAL CORPORATION

B-5

PROJECT *Jet Propulsion Laboratory*
LOCATION *Seepage Pit No. 37*
GEOLOGIST *B.G. Randolph*
DRILLING CO *Beylik Drilling*
DATE (start/finish) *9-3-94 / 9-3-94*

DRILLING METHOD *Percussion Hammer*
SAMPLING METHOD *2 1/2-inch split-spoon*
SURFACE ELEVATION *1126.8 Feet*
TOTAL DEPTH (ft) *12*
DEPTH TO WATER (ft) *Not Encountered*

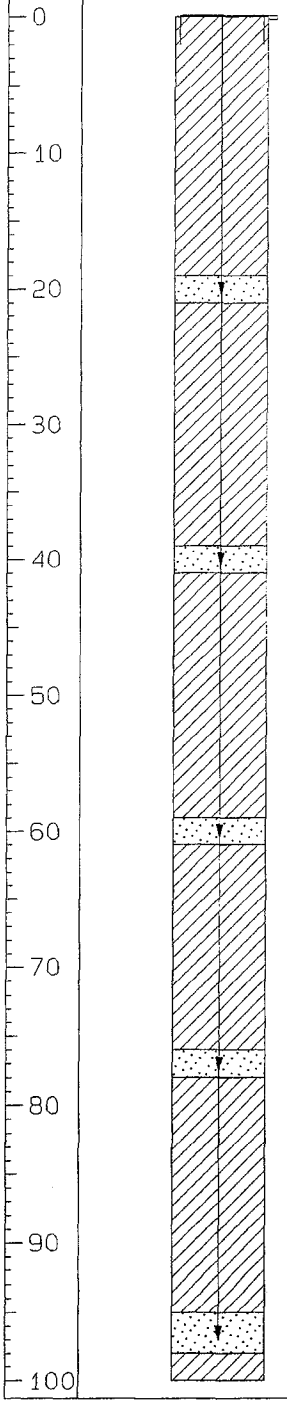
Depth (ft)	Soil-Vapor Well Completion	Sample No.	Samples	% Recovery	OVA (ppm) Drill Pipe	OVA (ppm) Sample	OVA (ppm) Breath Zn	Lithology	USCS Symbol	Lithologic Description and Notes
0		VPSS-13		100	0	0	0		GP	ASPHALT pavement (3 inches thick). Gravel base for pavement
									SP	GRAVELLY SAND - Fine gravelly fine to coarse sand with trace silt and coarse gravel, orange-brown to gray-brown, damp to slightly moist, dense.
10									SM	SILTY SAND - Silty fine sand, dark gray-brown, slightly moist, micaceous.
									SP	SAND - Fine to medium sand with some silt, coarse sand and occassional pieces fine gravel, dark orange brown to dark gray-brown, slightly moist, medium dense, trace mica and roots.
										Boulder at 12', very hard. Refusal: 200 blows for 1/8-inch penetration.
20										
30										
40										
50										
60										
70										
80										
90										
100										

FOSTER WHEELER ENVIRONMENTAL CORPORATION

B-6

PROJECT *Jet Propulsion Laboratory*
LOCATION *Seepage Pit No. 6*
GEOLOGIST *B.G. Randolph*
DRILLING CO *Beylik Drilling*
DATE (start/finish) *9-4-94 / 9-5-94*

DRILLING METHOD *Percussion Hammer*
SAMPLING METHOD *2 1/2-inch split-spoon*
SURFACE ELEVATION *1137.5 Feet*
TOTAL DEPTH (ft) *100.5*
DEPTH TO WATER (ft) *Not Encountered*



Depth (ft)	Sample No.	Samples	% Recovery	OVA (ppm) Drill Pipe	OVA (ppm) Sample	OVA (ppm) Breath Zn	Lithology	USCS Symbol	Lithologic Description and Notes
0								GP	ASPHALT pavement (4 inches thick). Gravel base for pavement.
								SP	SAND - Fine to coarse sand with some silt, fine gravel and occassional pieces coarse gravel, light orange- brown to light gray-brown, slightly moist, medium dense.
10	VPSS-14		100	0.5	0	0			Fine to coarse sand with some fine to coarse gravel and trace silt, dark orange-brown, moist, medium dense, trace mica.
								SP SM	SAND AND SILTY SAND - Alternating thin lenses fine to coarse sand with some silt and silty fine to coarse sand with occasional pieces of fine gravel, dark orange-brown, moist, medium dense, micaceous.
20	VPSS-15		100	0.7	0	0			
30	VPSS-16		100	0	0	0			Alternating thin lenses light gray fine to coarse sand with some fine gravel, pale yellowish-brown silty fine to medium sand and dark orange-brown silty fine to medium sand with occasional pieces fine gravel, all very moist, medium dense, micaceous.
40				0.5	-	0		GP	GRAVELLY COBBLES AND BOULDERS - Granitic and granodioritic rock fragments with some fine gravel and sand 39' to 47.5'.
			0	-	-	-			
			0	-	-	-			
50	VPSS-17		80	0.5	0.5	0		GM	SILTY SANDY GRAVEL - Silty fine to coarse sandy gravel with trace clay, mottled dark orange-brown, gray-brown, and pale yellowish-brown, moist, dense, micaceous.
	VPSS-18		100	0.5	0	0			
								SP	SAND - Fine to medium sand with some coarse sand and fine gravel, dark orange-brown, moist, dense, micaceous.
60	VPSS-19		100	1	0.5	0		SP SM	SAND AND SILTY SAND - Alternating thin lenses light orange-brown fine to coarse sand with occasional pieces fine gravel and dark orange-brown silty fine sand, moist, very dense, micaceous.
								GP	SANDY GRAVEL - Fine to coarse sandy fine fine to coarse gravel, light orange-brown to pale yellowish- brown, slightly moist, very dense.
70	VPSS-20		90	0	0	0			Numerous cobbles and boulders from 66' to 93'.
									Fine to coarse sandy fine gravel with trace silt, light yellowish-brown to light brownish-gray, micaceous.
									Thin lenses of fine to coarse gravelly fine to coarse sand 75'to 78', pale yellowish-brown to orange-brown, micaceous.
80				0.5	-	0			Occasional thin lenses fine to coarse sand from 83' to 85.5'.
									Boulder at 85.5'.
90			0	0	-	0		SP GP	GRAVELLY SAND AND SANDY GRAVEL - Alternating lenses sandy fine to coarse gravel with some silt and occasional pieces coarse gravel, and gravelly fine to coarse sand; orange-brown with some gray-brown mottling, moist, very dense, micaceous.
100			0	0	-	0			

FOSTER WHEELER ENVIRONMENTAL CORPORATION

B-7

PROJECT *Jet Propulsion Laboratory*
LOCATION *Near Seepage Pit Nos. 7, 7A and 7B*
GEOLOGIST *R. Tweidt*
DRILLING CO *Beylik Drilling*
DATE (start/finish) *9-5-94 / 9-8-94*

DRILLING METHOD *Percussion Hammer*
SAMPLING METHOD *2 1/2-inch split-spoon*
SURFACE ELEVATION *1115.8 Feet*
TOTAL DEPTH (ft) *60.5*
DEPTH TO WATER (ft) *59.5*

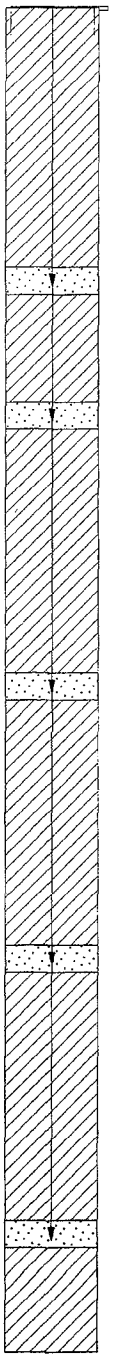
Depth (ft)	Soil-Vapor Well Completion	Sample No.	Samples	% Recovery	OVA (ppm) Drill Pipe	OVA (ppm) Sample	OVA (ppm) Breath Zn	Lithology	USCS Symbol	Lithologic Description and Notes
0									SP	ASPHALT pavement (4 inches thick). SAND (FILL) - Fine to medium sand with some silt and coarse sand, brown, damp, medium dense.
10					0	-	0		SP	SAND - Fine to medium sand with some coarse sand and fine to coarse gravel and trace silt, pale brown to orange-brown, damp to slightly moist, dense, micaceous. Sampler bouncing on rock at 9'. Numerous cobbles from 9' to 20'; occasional boulder.
20				0	0.5	-	0			(Fresh granitic rock plugged-off bit.) Numerous cobbles and boulders from 20' to total depth.
30		VPSS-21		100	1.5	1.5	0			Fine to coarse sand with some silt and fine gravel, orange-brown, moist.
40				25	0.5	-	0			Granitic rock gragments.
50		VPSS-22		100	1	4.5	0			Moist, very dense. Fine to medium sand with some silt, dark orange-brown.
60		VSS-23		100	0.5	0.5	0			Encounter groundwater at 59.5' during sampling.
70										
80										
90										
100										

FOSTER WHEELER ENVIRONMENTAL CORPORATION

B-8

PROJECT *Jet Propulsion Laboratory*
LOCATION *Waste Pit Area No. 3*
GEOLOGIST *R. Tweidt / B.G. Randolph*
DRILLING CO *Beylik Drilling*
DATE (start/finish) *9-8-94 / 9-9-94*

DRILLING METHOD *Percussion Hammer*
SAMPLING METHOD *2 1/2-inch split-spoon*
SURFACE ELEVATION *1256.6 Feet*
TOTAL DEPTH (ft) *101.5*
DEPTH TO WATER (ft) *Not Encountered*

Depth (ft)	Soil-Vapor Well Completion	Sample No.	Samples	% Recovery	OVA (ppm) Drill Pipe	OVA (ppm) Sample	OVA (ppm) Breath Zn	Lithology	USCS Symbol	Lithologic Description and Notes
0									SM	ASPHALT pavement (3 inches thick). SILTY SANDY SILT – Silty fine to medium sand with some fine gravel, dark yellowish brown, damp, dense, micaceous.
10		VPSS-24		100	0	0.5	0			
20		VPSS-25		100	0	2	0		SP	SAND – Fine to medium sand with some coarse sand and fine gravel and trace silt, yellowish-brown to orange-brown, slightly moist, dense, micaceous. Occasional cobble 21' to 28'.
30		VPSS-26		100	1	1.5	0			
40		VPSS-27		100	0	1	0		SM	SILTY SAND – Silty fine to medium sand with some fine gravel, yellowish brown to orange-brown, moist, dense.
50		VPSS-28		100	0	3	0			Granitic boulder from 51' to 54'.
60				0	1	–	0			(Fresh granitic rock plugged bit.)
		VPSS-29		85	0	0	0			
70				0	0	–	0		SP GP	GRAVELLY SAND AND SANDY GRAVEL – Alternating lenses gravel fine to coarse sand and sandy fine to coarse gravel with some silt and cobbles, light to dark orange-brown, slightly moist, medium dense, micaceous. Boulder at 70'. Numerous cobbles and small boulders 72' to 77'.
80		VPSS-30		80	0	0	0			Gravelly fine to coarse sand with trace silt, orange-brown.
90				10	1	0.5	0			Sandy fine to coarse gravel. Silty sandy gravel, micaceous. Boulders from 93.5' to 95.5'.
100		VPSS-31		100	1	0	0			Fine gravelly fine to coarse sand, mottled pale yellowish- brown, orange-brown, dark brownish-gray and pale grayish- white, slightly moist, very dense.

FOSTER WHEELER ENVIRONMENTAL CORPORATION

B-9

PROJECT *Jet Propulsion Laboratory*
LOCATION *Seepage Pit No. 19*
GEOLOGIST *B.G. Randolph*
DRILLING CO *Beylik Drilling*
DATE (start/finish) *9-10-94 / 9-10-94*

DRILLING METHOD *Percussion Hammer*
SAMPLING METHOD *2 1/2-inch split-spoon*
SURFACE ELEVATION *1230.8 Feet*
TOTAL DEPTH (ft) *90*
DEPTH TO WATER (ft) *Not Encountered*

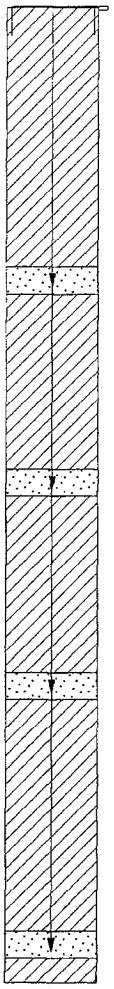
Depth (ft)	Soil-Vapor Well Completion	Sample No.	Samples	% Recovery	OVA (ppm) Drill Pipe	OVA (ppm) Sample	OVA (ppm) Breath Zn	Lithology	USCS Symbol	Lithologic Description and Notes
0									GP/SP	ASPHALT pavement (4 inches thick). Gravel base for pavement. SAND (FILL) - Fine to coarse sand with some fine gravel, orange-brown, slightly moist, medium dense, micaceous.
10		VPSS-32		100	0	0	0		SP	SAND - Gravelly fine to coarse sand with trace silt, orange-brown, slightly moist, medium dense, micaceous. Fine to coarse sand with some silt.
20		VPSS-33 VPSS-34		100	0	1	0		GP	Cobbles at 16'. Occasional pieces fine to coarse gravel. SANDY GRAVEL - Fine to coarse sandy fine to coarse gravel with trace silt, slightly moist, very dense.
30				10	0.5	-	0			Cobbles from 28' to 32'. Granitic and dioritic rock fragments with some orange-brown sand matrix, slightly moist, very dense. Boulders from 32 to 33.5'.
40		VPSS-35		80	0	0	0			Numerous cobbles from 33.5' to 47'. Gravel with some fine to medium sand and trace silt.
50		VPSS-36		100	0	0	0			Decomposed granite, very highly weathered, pale pink with some dark green specks, moist, very dense, trace mica.
		VPSS-37		100	0	0	0		SP	GRAVELLY SAND - Gravelly fine to medium sand with some silt, mottled pale yellowish-brown, light orange-brown, and gray-brown, slightly moist, very dense, micaceous. Occasional cobbles from 53' to 56'.
60		VPSS-38		100	0	0.5	0			Decomposed granitic and granodioritic rock, mottled pale yellowish-brown, orange-brown and light gray-brown, slightly moist, very dense. Boulder from 60' to 66'.
70				0	0	-	0		GP	SANDY GRAVEL - Fine to coarse sandy gravel with cobbles and trace silt, light yellow-brown to orange-brown and occasionally gray-brown, slightly moist, very dense, trace mica. From 71' to 80', cuttings include sandy fine gravel, fragments of fresh and highly weathered granite, and occasional walnut-size pieces of laminated fine sandy silt with traces of clay.
80		VPSS-39		80	1	0	0			Decomposed granitic rock (equavilent to a SP soil type), pale yellowish-white to gray-brown and dark orange-brown, trace of clay in weathered rock, moist.
90				0	0	-	0		GP/GM	Rock fragments are highly weathered granitic and dioritic from 84' to 90'. Occasional thin (1 to 2 inches thick) lenses of silty fine sand with trace of clay from 86' to 90', moist, micaceous. Sampler bouncing on large boulder, 8 blows for 1/2-inch penetration. Terminate boring.
100										

FOSTER WHEELER ENVIRONMENTAL CORPORATION

B-10

PROJECT *Jet Propulsion Laboratory*
LOCATION *Seepage Pit No. 30*
GEOLOGIST *B.G. Randolph*
DRILLING CO *Beylik Drilling*
DATE (start/finish) *9-12-94 / 9-13-94*

DRILLING METHOD *Percussion Hammer*
SAMPLING METHOD *2 1/2-inch split-spoon*
SURFACE ELEVATION *1232.8 Feet*
TOTAL DEPTH (ft) *72*
DEPTH TO WATER (ft) *Not Encountered*



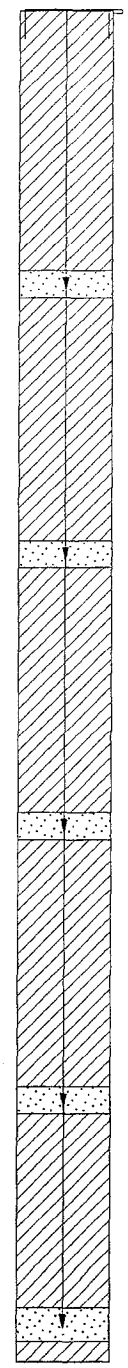
Depth (ft)	Sample No.	Samples	% Recovery	OVA (ppm) Drill Pipe	OVA (ppm) Sample	OVA (ppm) Breath Zn	Lithology	USCS Symbol	Lithologic Description and Notes
0								GM	ASPHALT pavement (4 inches thick).
									Gravel base for pavement.
								SM	SILTY SAND (FILL) - Silty fine to coarse sand with occasional silty fine gravel, dark orange-brown, moist, medium dense, micaceous. Occasional pieces coarse gravel from 5' to 8'. Fine roots materials at 8.5'.
10	VPSS-40		100	0	0	0		SP	SAND - Fine to medium sand with some silt and occasional coarse sand, orange-brown, slightly moist, medium dense, trace mica.
									Occasional pieces fine gravel from 16' to 25'. Silt content decreasing.
20	VPSS-42 VPSS-41		100	0	0	0			Fine to coarse sand with some silt and occasional pieces fine gravel, micaceous.
								SP	SAND AND SILTY SAND - Alternating thin lenses fine to coarse sand with trace silt an silty fine to medium sand with occasional pieces coarse sand, fine gravel, and traces of clay, moist, medium dense, micaceous.
30	VPSS-43		100	0	0	0		SM	
								ML	SILT AND CLAY - Light gray-brown, fine sandy silt with trace clay, moist, micaceous, firm to very firm; and light to dark gray-brown clayey silt, dry to damp, very hard.
								CL	
								SM	*SILTY SAND AND SILTY GRAVEL - Alternating thin lenses silty fine* to coarse sand with some fine gravel, and sitly sandy fine to coarse gravel, pale yellowish-brown to orange-brown to gray-brown, slightly moist, dense, micaceous. Cobbles at 36'.
								GM	
40	VPSS-44		100	0	0	0		ML	
								CL	CLAYEY SILT - Fine sandy clayey silt with occasional coarse sand and fine gravel, mottled orange-brown and gray-brown, damp to slightly moist, hard to very hard, trace mica.
								SP	GRAVELLY SAND AND SANDY GRAVEL - Alternating thin lenses gravelly fine to coarse sand with some silt and fine to coarse sandy gravel with occasional cobbles and trace silt, light orange-brown to pale gray-brown, slightly moist, dense, micaceous.
								GP	
50	VPSS-45		80	0	0	0			Silty fine to coarse sand, mottled pale yellowish-gray, dark *brown-gray, and pale orange-brown.*
								GM	SILTY SANDY GRAVEL - Fine to medium sandy gravel with some silt and coarse sand, slightly moist, very dense, very micaceous.
									Cobbles and boulder from 57' to 59.5'.
60	VPSS-46		100	0	0	0			Silty sandy fine to coarse gravel, mottled pale yellowish-brown, light gray, light to dark orange-brown, and dark brownish-gray, damp to slightly moist, very dense, micaceous.
									Cobbles and boulders from 63' to 69.5'.
70	VPSS-47		100	0	0	0		SP	SAND AND SILTY GRAVEL - Fine to coarse sand with trace silt and clay and silty fine to coarse sandy fine gravel with trace clay; mottled dark orange-brown, pale yellowish-brown, orange-brown and dark gray-brown; slightly moist, very dense.
								GM	
									Boulder at 71.5', very hard. Refusal at 72' (800 blows for 6 inches penetration).
80									
90									
100									

FOSTER WHEELER ENVIRONMENTAL CORPORATION

B-11

PROJECT *Jet Propulsion Laboratory*
LOCATION *Seepage Pit No. 17*
GEOLOGIST *B.G. Randolph*
DRILLING CO *Beylik Drilling*
DATE (start/finish) *9-17-94 / 9-17-94*

DRILLING METHOD *Percussion Hammer*
SAMPLING METHOD *2 1/2-inch split-spoon*
SURFACE ELEVATION *1193.1 Feet*
TOTAL DEPTH (ft) *100*
DEPTH TO WATER (ft) *Not Encountered*



Depth (ft)	Sample No.	Samples	% Recovery	OVA (ppm) Drill Pipe	OVA (ppm) Sample	OVA (ppm) Breath Zn	Lithology	USCS Symbol	Lithologic Description and Notes
0								GP	ASPHALT pavement (4 inches thick).
								GP	Gravel base for pavement.
								SP	SAND - Fine to medium sand with some coarse sand and trace silt, orange-brown, slightly moist, medium dense, trace mica.
									Occasional pieces fine gravel.
10	VPSS-48		100	0	0	0			Micaceous.
									Some fine gravel from 16' to 20'.
20	VPSS-49		100	0	0	0			Fine to coarse sand with trace silt and occasional pieces fine gravel, dark orange-brown.
									Becoming dense at 24'; slight increase in silt content.
30	VPSS-50		100	0	0	0			Fine to coarse sand with some silt and trace fine gravel, orange-brown, moist, dense.
									Occasional pieces fine and coarse gravel from 33' to 55'.
40	VPSS-51		100	0	0	0			Medium to coarse sand with some fine sand and trace silt, pale yellowish-brown to light orange-brown, trace mica.
	VPSS-52		100	0	0	0			
50	VPSS-53		100	0	0	0			Fine to coarse sand with trace silt, dark orange-brown.
								GP	SANDY GRAVEL - Fine to coarse sandy fine to coarse gravel with cobbles, boulders and trace silt, pale yellowish-brown, paly gray, and dark orange-brown, damp to slightly moist, very dense.
60									Granitic rock fragements with sandy soil matrix.
	VPSS-54		100	0	0	0		SP	GRAVELLY SAND - Fine gravelly fine to coarse sand with trace silt, orange-brown, slightly moist, very dense, micaceous.
70	VPSS-55		100	0	0.5	0			Boulder from 73.5' to 70'.
								GP GM	SANDY GRAVEL - Silty fine to medium sandy gravel with cobbles and small boulders, light yellowish-brown to mottled pale yellowish-brown and dark brown-gray, damp to slightly moist, very dense, micaceous.
80			20						Granitic rock fragments with trace silty fine sand soil matrix.
									Occasional thin lenses silty fine to medium sand from 82' to 93', dark orange-brown, micaceous.
90			0						Numerous cobbles from 83' to 88'.
									(Lost sample during retrieval.)
								SP	GRAVELLY SAND - Fine gravelly fine to medium sand with some coarse sand, orange-brown, slightly moist, very dense, micaceous.
100	VPSS-57		90	0	0	0		GP	SANDY GRAVEL - Fine to coarse sandy gravel with trace silt, pale yellowish-brown to dark orange-brwon, slightly moist to moist, very dense, micaceous.

FOSTER WHEELER ENVIRONMENTAL CORPORATION

B-12

PROJECT: Jet Propulsion Laboratory
LOCATION: Waste Pit Area No. 2
GEOLOGIST: B.G. Randolph
DRILLING CO: Beylik Drilling
DATE (start/finish): 9-19-94 / 9-19-94

DRILLING METHOD: Percussion Hammer
SAMPLING METHOD: 2 1/2-inch split-spoon
SURFACE ELEVATION: 1097.9 Feet
TOTAL DEPTH (ft): 81
DEPTH TO WATER (ft): Not Encountered

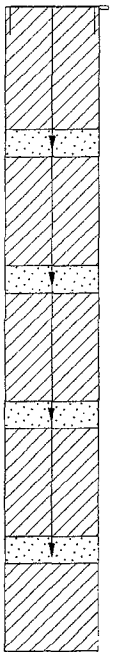
Depth (ft)	Soil-Vapor Well Completion	Sample No.	Samples	% Recovery	OVA (ppm) Drill Pipe	OVA (ppm) Sample	OVA (ppm) Breath Zn	Lithology	USCS Symbol	Lithologic Description and Notes
0									SP	Asphalt pavement (3-inches thick).
										GRAVELLY SAND (FILL) - Gravelly fine to coarse sand with trace silt, dark orange-brown, moist, medium dense, micaceous.
										Coarse gravel and cobbles from 7' to 8.5'.
10		VPSS-58		80	0	0	0			Traces of fine roots.
				0	0	-	-		GP	SANDY GRAVEL - Fine to coarse sandy fine to coarse gravel with trace silt, pale yellowish-brown and orange-brown, slightly moist, very dense, micaceous.
				0	0	-	0			Numerous cobbles and boulders from 15' to 24'.
20										
		VPSS-59		100	0	0	0			
30										
		VPSS-60		100	0	0	0		SP	GRAVELLY SAND - Fine to coarse gravelly fine to coarse sand with trace silt, mottled pale yellowish-brown and orange-brown with dark gray-brown, slightly moist, very dense, micaceous.
										Cobbles from 36.5' to approximately 38.5'.
40		VPSS-61		100	0	0	0			
									SP GP	GRAVELLY SAND AND SANDY GRAVEL - Alternating thin lenses gravelly fine to coarse sand with trace silt, and fine to coarse sandy gravel with occasional cobbles or small boulders; yellowish-brown to orange-brown, slightly moist, very dense, micaceous.
50				20	0	-	0			Granitic and dioritic rock fragments with trace silty fine to medium sand as soil matrix.
									SP	GRAVELLY SAND - Fine gravelly fine to coarse sand with trace silt and occasional coarse gravel and cobbles, orange-brown, moist, dense, micaceous.
60		VPSS-62		100	0	0	0			Mottled orange-brown and gray-brown, slightly moist.
										Moist at 64'.
70		VPSS-63		100	0	0	0			Fine to medium sand with some coarse sand and occasional pieces fine gravel, yellowish-brown to dark orange-brown, moist.
										Becoming more moist at approximately 77'. Gravelly fine to coarse sand with trace silt.
80				20	0	0	0			Granitic rock fragments with trace silty fine to medium sand as soil matrix, very moist.
										In capillary fringe; terminate boring.
90										
100										

FOSTER WHEELER ENVIRONMENTAL CORPORATION

B-13

PROJECT *Jet Propulsion Laboratory*
LOCATION *West end of Building 197*
GEOLOGIST *B.G. Randolph*
DRILLING CO *Beylik Drilling*
DATE (start/finish) *9-20-94 / 9-20-94*

DRILLING METHOD *Percussion Hammer*
SAMPLING METHOD *2 1/2-inch split-spoon*
SURFACE ELEVATION *1239.2 Feet*
TOTAL DEPTH (ft) *48*
DEPTH TO WATER (ft) *Not Encountered*

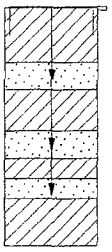
Depth (ft)	Soil-Vapor Well Completion	Sample No.	Samples	% Recovery	OVA (ppm) Drill Pipe	OVA (ppm) Sample	OVA (ppm) Breath Zn	Lithology	USCS Symbol	Lithologic Description and Notes
0									GP	Asphalt pavement (3-inches thick).
										Base materials for pavement.
									SP	GRAVELLY SAND AND SANDY GRAVEL (FILL) - Gravelly fine to coarse sand with trace silt and fine to coarse sandy fine gravel, orange-brown, slightly moist, medium dense.
									GP	
10		VPSS-64		100	0	0	0		GP	SANDY GRAVEL - Fine to coarse sandy fine to coarse gravel, light gray-brown and orange-brown, slightly moist, medium dense to dense, micaceous.
									SP	GRAVELLY SAND - Fine to coarse sandy fine to coarse gravel; light gray-brown and orange-brown, slightly moist, medium dense to dense, micaceous.
									SP	GRAVELLY SAND AND SANDY GRAVEL - Alternating lenses of gravelly fine to coarse sand with some silt, and fine to medium sandy fine gravel with some silt and trace clay; mottled light yellowish-brown, orange-brown and gray-brown, slightly moist, to moist, medium dense to dense, some mica.
20		VPSS-65		100	0	0	0		GP	
									GM	SILTY SANDY GRAVEL - Silty fine to medium sandy fine to coarse gravel with trace clay and occasional cobbles, light yellow-brown to orange-brown, slightly moist to moist, dense, micaceous.
									SP	GRAVELLY SAND - Gravelly fine to medium sand with some silt and trace clay, mottled light yellow-brown and orange-brown, slightly moist to moist, very dense, micaceous.
30		VPSS-66		100	1.5	0	0		GP	
										Cobbles at 38'.
40				0	0	-	0		GR	GRANITIC ROCK - Highly weathered fine-grained grainitc / granodioritic rock; nearly decompossed at contact and increases in hardness with depth.
										Terminate Boring.
50										
60										
70										
80										
90										
100										

FOSTER WHEELER ENVIRONMENTAL CORPORATION

B-14

PROJECT *Jet Propulsion Laboratory*
LOCATION *Seepage Pit No. 33*
GEOLOGIST *B.G. Randolph*
DRILLING CO *Beylik Drilling*
DATE (start/finish) *9-22-94 / 9-22-94*

DRILLING METHOD *Percussion Hammer*
SAMPLING METHOD *2 1/2-inch split-spoon*
SURFACE ELEVATION *1213.0 Feet*
TOTAL DEPTH (ft) *18*
DEPTH TO WATER (ft) *Not Encountered*

Depth (ft)	Soil-Vapor Well Completion	Sample No.	Samples	% Recovery	OVA (ppm) Drill Pipe	OVA (ppm) Sample	OVA (ppm) Breath Zn	Lithology	USCS Symbol	Lithologic Description and Notes
0		VPSS-67		100	0	100	0		GP/SP	Asphalt pavement (3-inches thick). Base material for pavement. SAND (FILL) - Fine to coarse sand with trace silt, some fine gravel and occasional cobbles; gray-brown to orange-brown, slightly moist, *mdeium dense, micaceous.*
10									SM/SP	SILTY SAND AND SAND - Alternating thin layers dark orange-brown silty fine to medium sand and dark orange-brown fine to coarse sand with trace silt, occasional fine root holes, slightly moist to moist, medium dense, micaceous. (Slight hydrocarbon odor.)
									GP	GRAVEL - Fine to coarse sandy gravel with cobbles and trace silt, light yellow-brown to orange-brown, damp to slightly moist, very dense. Boulder from 14.5' to 16'.
					310	5	0		GR	GRANITIC ROCK - Moderately weathered fine-grained grainitic/ granodioritic rock; became very hard after 1.5 feet of penetration. Refusal at 18' (800 blows for last 2.5-inches penetration).
20										
30										
40										
50										
60										
70										
80										
90										
100										

FOSTER WHEELER ENVIRONMENTAL CORPORATION

B-15

PROJECT *Jet Propulsion Laboratory*
LOCATION *Seepage Pit No. 16*
GEOLOGIST *B.G. Randolph*
DRILLING CO *Beylik Drilling*
DATE (start/finish) *9-24-94 / 9-24-94*

DRILLING METHOD *Percussion Hammer*
SAMPLING METHOD *2 1/2-inch split-spoon*
SURFACE ELEVATION *1123.5 Feet*
TOTAL DEPTH (ft) *95*
DEPTH TO WATER (ft) *Not Encountered*

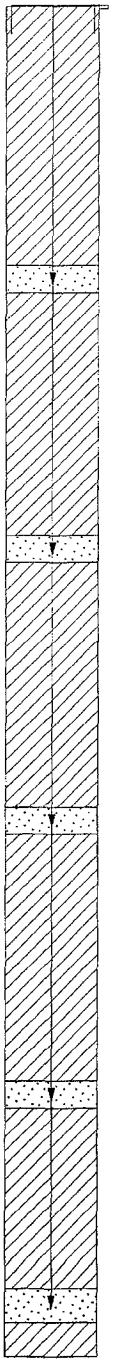
Depth (ft)	Soil-Vapor Well Completion	Sample No.	Samples	% Recovery	OVA (ppm) Drill Pipe	OVA (ppm) Sample	OVA (ppm) Breath Zn	Lithology	USCS Symbol	Lithologic Description and Notes
0									GP/SP	Asphalt pavement (4-inches thick). Gravel base for pavement. SAND - Fine to coarse sand with some fine gravel and trace silt, orange-brown, slightly moist, medium dense, micaceous.
10		VPSS-68		80	0	0	0		SP	GRAVELLY SAND - Fine to coarse gravelly fine to coarse sand with occasional cobble, light yellow-brown to orange-brown, slightly moist, dense, micaceous.
				0	0	0	0			(Rock plugged sampler bit.)
20		VPSS-69		100	0	0	0			Gravelly fine to coarse sand with trace silt, orange-brown, moist, medium dense.
										Alternating thin lenses fine to coarse sand with some fine gravel and trace silt, and fine to coarse sand with some silt from 25' to 38'; orange-brown, very moist, medium dense, micaceous.
30		VPSS-70		100	0	0	0			Very moist to wet.
40				0	0	-	0		GP	SANDY GRAVEL - Fine to coarse sandy gravel with some silt, orange-brown, moist to very moist, very dense, micaceous.
50				0	0	-	0		SP	GRAVELLY SAND - Fine to coarse gravelly fine to coarse sand with trace silt, very moist, dense, micaceous. Occasional cobbles from 48' to 54'.
									GP	SANDY GRAVEL - Fine to coarse sandy fine to coarse gravel with trace silt, orange-brown to gray-brown, slightly moist, very dense, micaceous.
60		VPSS-71		100	0	0	0		SP/GP	GRAVELLY SAND AND SANDY GRAVEL - Alternating thin layers orange-brown fine to coarse gravelly fine to coarse sand with trace silt and orange-brown fine to coarse sandy gravel with cobbles and trace silt, slightly moist to moist, dense to very dense, micaceous.
		VPSS-72		100	0	0	0			Fine gravelly fine to coarse sand, light yellowish-brown, slightly moist.
										Cobbles from 63' to 65.5'.
70		VPSS-73		85	0	0	0			Granitic rock fragments from gravel/cobbles, light orange-brown, dry, hard.
										Becoming less gravelly, more sandy (fine to medium sand).
80		VPSS-74		100	0	0	0		SP	SAND - Fine to coarse sand with trace silt, some fine to coarse gravel; orange-brown, moist, very dense, micaceous.
									GP	SANDY GRAVEL - Fine to coarse sandy gravel with occasional cobble and trace silt, orange-brown with some gray-brown mottling, moist, very dense, micaceous.
90				0	0	-	0			Fine gravelly fine to coarse sand from 87.5' to 90'; orange-brown, moist, dense. (Granitic rock plugged bit.) Very gravelly from 91.5' to 94'.
										Granitic boulder at 94'. Refusal at 95' (200 blows for 1/8-inch penetration).
100										

FOSTER WHEELER ENVIRONMENTAL CORPORATION

B-16

PROJECT *Jet Propulsion Laboratory*
LOCATION *Seepage Pit Nos. 20 and 21*
GEOLOGIST *B.G. Randolph*
DRILLING CO *Beylik Drilling*
DATE (start/finish) *9-28-94 / 9-29-94*

DRILLING METHOD *Percussion Hammer*
SAMPLING METHOD *2 1/2-inch split-spoon*
SURFACE ELEVATION *1199.2 Feet*
TOTAL DEPTH (ft) *101.5*
DEPTH TO WATER (ft) *Not Encountered*



Depth (ft)	Sample No.	Samples	% Recovery	OVA (ppm) Drill Pipe	OVA (ppm) Sample	OVA (ppm) Breath Zn	Lithology	USCS Symbol	Lithologic Description and Notes
0								GP/SP/GP	Asphalt pavement (3-inches thick). Gravel base for pavement. GRAVELLY SAND (FILL) - Gravelly fine to coarse sand with trace silt, dark orange-brown, slightly moist, medium dense, micaceous.
10			20	0	1.5	0		GP	SANDY GRAVEL - Fine to coarse sandy gravel with cobbles and trace silt, mottled light yellow-brown, light gray-brown and dark orange-brown, slightly moist, dense. Granitic rock fragments and trace sandy soil matrix.
								SP	SAND - Fine to coarse gravelly sand with trace silt, dark orange-brown, slightly moist to moist, dense, micaceous.
20	VPSS-75 VPSS-76		100	0	0	0			Fine to coarse sand with some fine gravel, orange-brown, dense. Occasional cobbles from 25' to 48'.
30	VPSS-77		100	0	0	0			Fine to medium sand with some coarse sand and silt, moist. Gravelly from 35' to 38'. Occasional thin lenses silty fine sand, dark orange-brown, very moist, from 38' to 43'.
40	VPSS-78		100	0	0	0			
								SP/SM	GRAVELLY SAND AND SILTY SAND - Alternating thin lenses fine gravelly fine to coarse sand with trace silt, and silty fine to medium sand; dark orange-brown, moist to very moist, dense, micaceous.
50	VPSS-80 VPSS-79		100	0	0	0		SP	SAND - Fine to coarse sand with some silt and fine gravel, dark orange-brown, moist, dense, micaceous.
60	VPSS-81		100	0	0	0			Mottled gray-brown and dark orange-brown, very moist. Occasional small cobbles from 62' to 65'.
								SM	SILTY SAND - Silty fine to medium sand, mottled dark orange-brown and gray-brown, moist, dense, micaceous.
70	VPSS-82		100	0	0	0		SP	SAND - Fine to medium sand with some fine to coarse gravel and trace silt, mottled gray-brown and orange-brown, moist, very dense, micaceous. Gravelly from 72' to 74'. Granitic boulder at 74.5'. Alternating thin lenses fine sand with some silt and fine to coarse sand with some fine to coarse gravel, orange-brown, very dense.
80	VPSS-83		100	0	0	0			Occasional small cobbles from 82' to 90'.
90	VPSS-84		100	0	0	0			Fine to coarse sand with some silt and fine gravel, mottled dark orange-brown and reddish-brown, moist, very dense, micaceous.
								SM	SILTY SAND - Silty fine to medium sand, dark reddish-brown, moist, very dense. Cobbles from 97' to 98'.
100									

FOSTER WHEELER ENVIRONMENTAL CORPORATION

B-16

PROJECT *Jet Propulsion Laboratory*
LOCATION *Seepage Pit Nos. 20 and 21*
GEOLOGIST *B.G. Randolph*
DRILLING CO *Beylik Drilling*
DATE (start/finish) *9-28-94 / 9-29-94*

DRILLING METHOD *Percussion Hammer*
SAMPLING METHOD *2 1/2-inch split-spoon*
SURFACE ELEVATION *1199.2 Feet*
TOTAL DEPTH (ft) *101.5*
DEPTH TO WATER (ft) *Not Encountered*

Depth (ft)	Soil-Vapor Well Completion	Sample No.	Samples	% Recovery	OVA (ppm) Drill Pipe	OVA (ppm) Sample	OVA (ppm) Breath Zn	Lithology	USCS Symbol	Lithologic Description and Notes
100		VPSS-85		100	0	0	0		SM	
110										
120										
130										
140										
150										
160										
170										
180										
190										
200										

FOSTER WHEELER ENVIRONMENTAL CORPORATION

B-17

PROJECT *Jet Propulsion Laboratory*
LOCATION *Seepage Pit No. 34*
GEOLOGIST *B.G. Randolph*
DRILLING CO *Beylik Drilling*
DATE (start/finish) *9-30-94 / 9-30-94*

DRILLING METHOD *Percussion Hammer*
SAMPLING METHOD *2 1/2-inch split-spoon*
SURFACE ELEVATION *1214.1 Feet*
TOTAL DEPTH (ft) *40*
DEPTH TO WATER (ft) *Not Encountered*

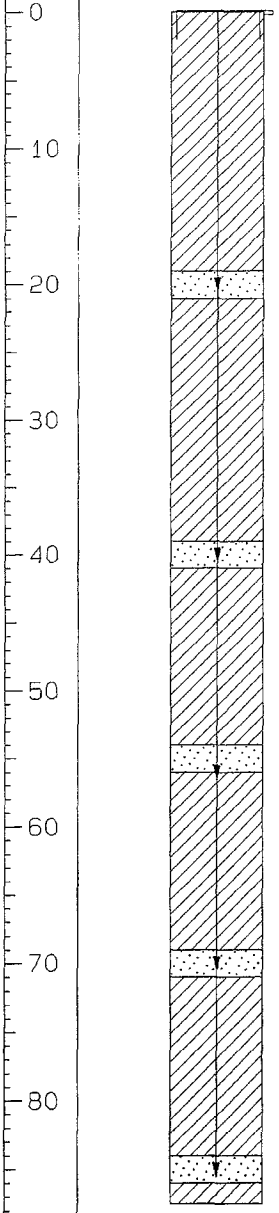
Depth (ft)	Soil-Vapor Well Completion	Sample No.	Samples	% Recovery	OVA (ppm) Drill Pipe	OVA (ppm) Sample	OVA (ppm) Breath Zn	Lithology	USCS Symbol	Lithologic Description and Notes
0									SP	Asphalt pavement (3-inches thick). SAND - Fine to coarse sand with some fine to coarse gravel and silt, orange-brown, damp, medium dense, micaceous.
10				0	0	-	0		SP GP	GRAVELLY SAND - Fine to coarse gravelly sand with trace silt, light yellow-brown to orange-brown, dry to damp, medium dense to dense, micaceous. (Sample lost during retrieval.)
				0	0	-	0		GP	SANDY GRAVEL - Sandy fine to coarse gravel with cobbles, orange-brown and gray-brown, damp, very dense.
20		VPSS-86		60	0	0	0			Numerous cobbles from 15' to 31'.
		VPSS-87		80	0	0	0			More sandy at 25.5'.
30				0	0	4*	0			Soil matrix in gravel is fine sandy clayey silt, dark orange-brown and gray-brown, very moist. 4* ppm in hole after pulling up 10'. Dioritic boulders from 31' to 40' with gravelly sand in matrix.
40										Terminate boring in dioritic boulder (400 blows for last 2-inches of penetration).
50										
60										
70										
80										
90										
100										

FOSTER WHEELER ENVIRONMENTAL CORPORATION

B-18

PROJECT *Jet Propulsion Laboratory*
LOCATION *Mariner Road - West side of Bldg. 306*
GEOLOGIST *R. Tweidt*
DRILLING CO *Beylik Drilling*
DATE (start/finish) *10-1-94 / 10-2-94*

DRILLING METHOD *Percussion Hammer*
SAMPLING METHOD *2 1/2-inch split-spoon*
SURFACE ELEVATION *1109.4 Feet*
TOTAL DEPTH (ft) *89.5*
DEPTH TO WATER (ft) *Not Encountered*



Depth (ft)	Sample No.	Samples	% Recovery	OVA (ppm) Drill Pipe	OVA (ppm) Sample	OVA (ppm) Breath Zn	Lithology	USCS Symbol	Lithologic Description and Notes
0								GP	Asphalt pavement (3-inches thick).
								GP	Gravel base for pavement.
								SM	SILTY SAND (FILL) - Silty fine to medium sand, dark gray-brown, moist, medium dense (several small pieces wood fragments in cuttings).
								SP	GRAVELLY SAND (FILL?) - Fine to medium sand with some coarse sandy fine gravel, light brownish gray, slightly moist, medium dense.
10	VPSS-88		100	0	0	0		ML	SILT - Fine sandy silt, dark gray-brown, slightly moist, firm.
								SP	SAND - Fine to medium sand with some coarse sand and fine gravel, light yellowish-brown, slightly moist, medium dense.
									Small boulder at 11'.
									Becoming more gravelly at 17.5'.
									Numerous cobbles from 19' to 23'.
20			0	0	-	0			
								SM	SILTY SAND - Silty fine sand with trace medium sand, yellowish-brown, slightly moist, medium dense, micaceous.
								SP	GRAVELLY SAND - Fine to coarse gravelly fine to medium sand with some coarse sand, yellowish-brown, slightly moist, dense.
30			0	0	-	0			Cobbles at 30.5'.
	VPSS-89		100	0	0	0			Very dense, micaceous.
									Numerous cobbles from 36' to 44'.
40			0	0	-	0			
	VPSS-90		100	0	0	0		SP	SAND - Fine to medium sand with trace coarse sand, yellowish-brown, slightly moist, dense, micaceous.
50	VPSS-91		100	0	0	0			Very dense.
									Gravelly from 53' to 56'.
									Becoming less dense at 56'.
60	VPSS-92		100	0	0	0			Occasional pieces fine gravel from 58' to 78'.
									Dense
70	VPSS-93		100	0	0	0			
80			0	0	0	0		SP	GRAVELLY SAND - Fine to coarse gravelly fine to medium sand with some coarse sand and trace silt, slightly moist, very dense.
								GP	Numerous cobbles and boulders from 80.5' to 89.5'.
90									Refusal at 89.5' (100 blows for 1/16-inch penetration).
100									

FOSTER WHEELER ENVIRONMENTAL CORPORATION

B-19

PROJECT *Jet Propulsion Laboratory*
LOCATION *Seepage Pit Nos. 23 and 24*
GEOLOGIST *B.G. Randolph*
DRILLING CO *Beylik Drilling*
DATE (start/finish) *10-3-94 / 10-3-94*

DRILLING METHOD *Percussion Hammer*
SAMPLING METHOD *2 1/2-inch split-spoon*
SURFACE ELEVATION *1196.3 Feet*
TOTAL DEPTH (ft) *46*
DEPTH TO WATER (ft) *Not Encountered*

Depth (ft)	Soil-Vapor Well Completion	Sample No.	Samples	% Recovery	OVA (ppm) Drill Pipe	OVA (ppm) Sample	OVA (ppm) Breath Zn	Lithology	USCS Symbol	Lithologic Description and Notes
0									GP	Asphalt pavement (3-inches thick).
									GP	Gravel base for pavement.
									SP	SAND - Fine to medium sand with trace coarse sand and fine gravel, orange-brown, slightly moist, dense, micaceous. *Becoming gravelly at 6.5'.*
10		VPSS-94		100	0	0	0		GP	SANDY GRAVEL - Gravelly fine to coarse sand with trace silt, mottled pale yellowish-brown, pale gray-brown and dark orange-brown, moist, dense, micaceous. Numerous cobbles from 12' to 23'.
20				0	0	-	0			Sampler on boulder at 20': 5 blows for zero penetration.
									SP	GRAVELLY SAND - Gravely fine to coarse sand with some silt and occasional cobbles, orange-brown, moist, dense, micaceous.
30		VPSS-95		100	0	0	0		GM	SILTY SANDY GRAVEL - Silty fine to coarse sandy fine gravel, *dark orange-brown, saturatued, dense micaceous.*
									SM	SILTY SAND - Silty fine to coarse snad with some fine gravel, dark orange-brown, moist to very moist, dense, micaceous.
40				0	0	-	0		GM	SILTY SANDY GRAVEL - Silty fine to coarse sandy fine to coarse gravel, dark orange-brown, moist to very moist, dense, micaceous. Sampler on boulder at 40' (6 blows for 1/2-inch penetration).
									SM GM	SILTY SAND AND SANDY GRAVEL - Alternating thin lenses silty fine to medium sand, fine to coarse sand with fine gravel, and silty fine to coarse sandy fine to coarse gravel with occasional cobbles; orange-brown to dark orange-brown, moist, dense to very dense, micaceous.
50										Refusal at 46' (600 blows for 1/2-inch penetration).
60										
70										
80										
90										
100										

FOSTER WHEELER ENVIRONMENTAL CORPORATION

B-19A

PROJECT *Jet Propulsion Laboratory*
LOCATION *Seepage Pit Nos. 23 and 24*
GEOLOGIST *B.G. Randolph*
DRILLING CO *Beylik Drilling*
DATE (start/finish) *10-4-94 / 10-4-94*

DRILLING METHOD *Percussion Hammer*
SAMPLING METHOD *2 1/2-inch split-spoon*
SURFACE ELEVATION *1196.4 Feet*
TOTAL DEPTH (ft) *101*
DEPTH TO WATER (ft) *Not Encountered*

Depth (ft)	Soil-Vapor Well Completion	Sample No.	Samples	% Recovery	OVA (ppm) Drill Pipe	OVA (ppm) Sample	OVA (ppm) Breath Zn	Lithology	USCS Symbol	Lithologic Description and Notes
0									GP	Asphalt pavement (3-inches thick).
									SP	Gravel base for pavement. SAND - Fine to medium sand with some coarse sand, fine gravel and trace silt, orange-brown, slightly moist to moist, dense, micaceous.
10									SP	GRAVELLY SAND AND SANDY GRAVEL - Fine to coarse sand with fine gravel and sandy fine to coarse gravel with trace silt, orange-brown, slighlty moist to moist, dense, micaceous.
									GP	SANDY GRAVEL - Gravelly fine to coarse sand with trace silt, mottled pale yellowish-brown, pale gray-brown, and dark orange-brown, slighlty moist to moist, dense, micaceous.
									GP	Cobbly from 12.5' to 23'.
20		VPSS-96		100	0	0	0			
									SP	GRAVELLY SAND - Gravelly fine to coarse sand with some silt and occasional cobbles, orange-brown, moist, dense, micaceous.
30									GM	SILTY SANDY GRAVEL - Silty fine to coarse sandy fine gravel, dark orange-brown, wet, dense, micaceous.
									SM	SILTY SAND - Silty fine to coarse sand with some fine gravel, dark orange-brown, moist to very moist, dense, micaceous.
									GP	SILTY SANDY GRAVEL - Silty fine to medium sandy gravel with some coarse sand, dark orange-brown, moist to very moist, dense to very dense, micaceous.
40		VPSS-97		100	0	0	0		GM	Fine to coarse sandy gravel with some silt. Cobbles and boulders from 44' to 49'.
									GP	SANDY GRAVEL, COBBLES AND BOULDERS - Silty fine to medium sandy gravel, cobbles and boulders, soil matrix is orange-brown, moist, dense, micaceous.
50		VPSS-98		100	0	0	0		SM	GRAVELLY SILTY SAND - Fine to coarse gravelly silty fine to medium sand with some coarse sand, orange-brown, moist, very dense, micaceous.
									GM	Alternating thin lenses silty fine to medium sandy gravel and gravelly silty fine sand from 53' to 70'.
60		VPSS-99		100	0	0	0			
70		VPSS-100		100	0	0	0			Silty fine sandy gravel, orange-brown, moist, dense, micaceous.
									GP	SILTY SANDY GRAVEL AND COBBLES - Silty fine to medium sandy gravel with cobbles and boulders, soil matrix is orange-brown, moist, micaceous. Rock fragments are granitic and dioritic.
									GM	Boulder at 77'
80				20	0	-	0			Granitic rock fragments with fine to coarse sand soil matrix.
									SP	GRAVELLY SAND AND SANDY GRAVEL - Alternating lenses of fine to coarse gravelly fine to coarse sand with trace silt and fine to medium sandy fine gravel with trace coarse sand and silt, orange-brown, moist, very dense.
90		VPSS-101		100	0	0	0		GP	Micaceous.
										Very gravelly from 96' to 101'.
100										

FOSTER WHEELER ENVIRONMENTAL CORPORATION

B-19A

PROJECT *Jet Propulsion Laboratory*
LOCATION *Seepage Pit Nos. 23 and 24*
GEOLOGIST *B.G. Randolph*
DRILLING CO *Beylik Drilling*
DATE (start/finish) *10-4-94 / 10-4-94*

DRILLING METHOD *Percussion Hammer*
SAMPLING METHOD *2 1/2-inch split-spoon*
SURFACE ELEVATION *1196.4 Feet*
TOTAL DEPTH (ft) *101*
DEPTH TO WATER (ft) *Not Encountered*

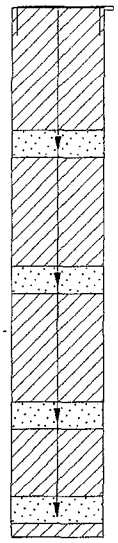
Depth (ft)	Soil-Vapor Well Completion	Sample No.	Samples	% Recovery	OVA (ppm) Drill Pipe	OVA (ppm) Sample	OVA (ppm) Breath Zn	Lithology	USCS Symbol	Lithologic Description and Notes
100		VPSS-102		80	0	0	0		SP GP	
110										
120										
130										
140										
150										
160										
170										
180										
190										
200										

FOSTER WHEELER ENVIRONMENTAL CORPORATION

B-20

PROJECT *Jet Propulsion Laboratory*
LOCATION *Seepage Pit No. 5*
GEOLOGIST *B.G. Randolph*
DRILLING CO *Beylik Drilling*
DATE (start/finish) *10-13-94 / 10-13-94*

DRILLING METHOD *Percussion Hammer*
SAMPLING METHOD *2 1/2-inch split-spoon*
SURFACE ELEVATION *1142.7 Feet*
TOTAL DEPTH (ft) *41.5*
DEPTH TO WATER (ft) *Not Encountered*

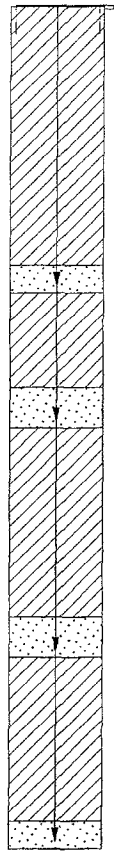
Depth (ft)	Soil-Vapor Well Completion	Sample No.	Samples	% Recovery	OVA (ppm) Drill Pipe	OVA (ppm) Sample	OVA (ppm) Breath Zn	Lithology	USCS Symbol	Lithologic Description and Notes
0									SP	Asphalt pavement (3-inches thick). SAND - Fine to coarse sand with trace fine gravel and silt, light to dark orange-brown, damp to slightly moist, medium dense, micaceous.
10		VPSS-114		100	0	1	0			Occasional pieces coarse gravel from 5' to 18'. Fine to coarse sand with trace silt and some fine gravel, dark brown and orange-brown, moist, dense, micaceous.
20		VPSS-115		100	0	0	0			Fine to medium sand with trace coarse sand and some silt, mottled ornage-brown and dark brown, very moist, dense, micaceous. Occasional balls of silt with trace clay up to 2-inches in diameter from 25' to 29'.
30		VPSS-116		100	0	0	0		SM ML SP GP	SILTY SAND AND SANDY SILT - Alternating thin lenses of silty fine to medium sand with trace coarse sand, and fine sandy silt with trace clay; dark orange-brown, very moist, dense, micaceous. Becoming more sandy and gravelly. GRAVELLY SAND AND SANDY GRAVEL - Fine to coarse gravelly *fine to coarse sand and sandy fine to coarse gravel with cobbles;* orange-brown, moist, very dense, micaceous.
40				20	0	-	0			Granitic rock fragments, damp. Refusal at 41.5' (400 blows for 1/8-inch penetration).
50										
60										
70										
80										
90										
100										

FOSTER WHEELER ENVIRONMENTAL CORPORATION

B-20A

PROJECT *Jet Propulsion Laboratory*
LOCATION *Mariner Road near Seepage Pit No. 5*
GEOLOGIST *B.G. Randolph*
DRILLING CO *Beylik Drilling*
DATE (start/finish) *10-22-94 / 10-23-94*

DRILLING METHOD *Percussion Hammer*
SAMPLING METHOD *2 1/2-inch split-spoon*
SURFACE ELEVATION *1142.7 Feet*
TOTAL DEPTH (ft) *72*
DEPTH TO WATER (ft) *70' to 71'*

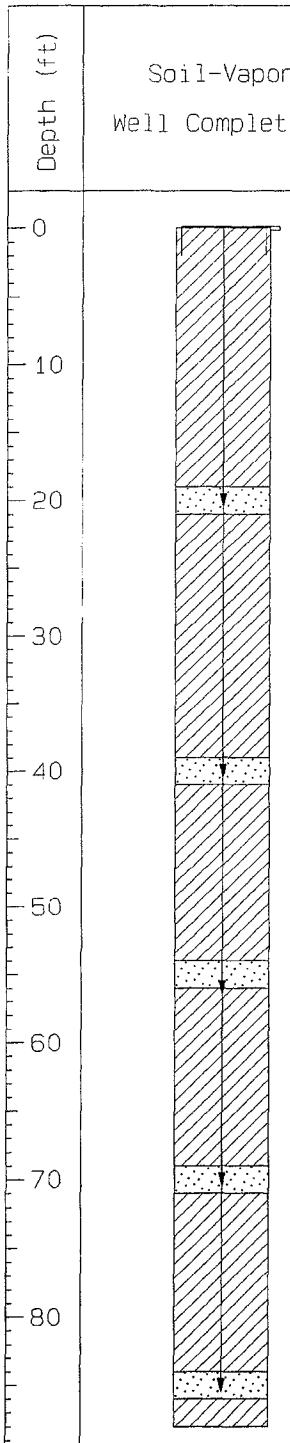
Depth (ft)	Soil-Vapor Well Completion	Sample No.	Samples	% Recovery	OVA (ppm) Drill Pipe	OVA (ppm) Sample	OVA (ppm) Breath Zn	Lithology	USCS Symbol	Lithologic Description and Notes
0									GP	Asphalt pavement (3-inches thick).
									SP	Gravel base for pavement.
										SAND - Fine to medium sand with trace silty coarse sand and fine gravel, dark orange-brown, moist, medium dense, micaceous.
										Occasional pieces coarse gravel from 7' to 10'.
10		VPSS-125		100	0	0	0		GP	SANDY GRAVEL - Fine to medium sandy gravel with small cobbles, light yellowish-brown and orange-brown, slightly moist, dense.
									SP	SAND - Fine to medium sand with trace silt and fine gravel, dark orange-brown, slightly moist to moist, dense, micaceous.
										Occasional pieces coarse gravel from 16' to 30'.
20		VPSS-126		100	0	0	0			Dark orange-brown with trace of gray-brown mottling, moist.
		VPSS-127								
										Cobble at 25'.
										Occasional thin lenses silty fine to medium sand from 26' to 30'.
30				20	0	-	0		GM	SILTY GRAVEL - Silty fine to coarse gravel with some fine to medium sand, dark orange-brown, very moist, dense, micaceous.
									GP	SANDY GRAVEL - Fine to coarse sandy fine to coarse gravel with occasional small cobbles and trace silt, dark orange- brown, moist, very dense, micaceous.
40				20	0	-	0			Small granitic boulders at 37'.
										Granitic rock fragments with trace of silty fine to medium sand soil matrix, damp to slightly moist.
										Granitic boulders at 43'
				20	0	-	0		SP	GRAVELLY SAND - Fine to coarse gravelly fine to coarse sand with trace silt, orange-brown, moist, dense, micaceous.
50		VPSS-128		100	0	0	0			Fine to coarse sand with some fine gravel and trace silt, pale brown to dark orange-brown.
										Gravelly from 57' to 63' with cobbles at 57'. Fragments of fresh and decomposed granitic rock.
60				20	0	-	0		GP	SANDY GRAVEL - Fine to coarse sandy fine to coarse gravel with cobbles; pale orange-brown, pale gray-brown and orange-brown; damp to slightly moist, very dense, micaceous.
									SP	GRAVELLY SAND - Fine gravelly fine to coarse sand with trace silt, dark orange-brown, slightly moist to moist, very dense, micaceous.
									GP	SANDY GRAVEL - Fine to medium sandy fine gravel with some coarse sand and coarse gravel, light orange-brown, slightly moist, very dense, micaceous.
70		VPSS-129		100	0	0	0			Saturated at 72'; discharging water from borehole through cyclone. Water level stablizied at 63.95' below ground surface. Perched Groundwater encountered at approximately 70' to 71'.
80										
90										
100										

FOSTER WHEELER ENVIRONMENTAL CORPORATION

B-21

PROJECT *Jet Propulsion Laboratory*
LOCATION *Near Seepage Pit No. 14*
GEOLOGIST *B.G. Randolph*
DRILLING CO *Beylik Drilling*
DATE (start/finish) *10-8-94 / 10-9-94*

DRILLING METHOD *Percussion Hammer*
SAMPLING METHOD *2 1/2-inch split-spoon*
SURFACE ELEVATION *1127.1 Feet*
TOTAL DEPTH (ft) *90*
DEPTH TO WATER (ft) *Not Encountered*



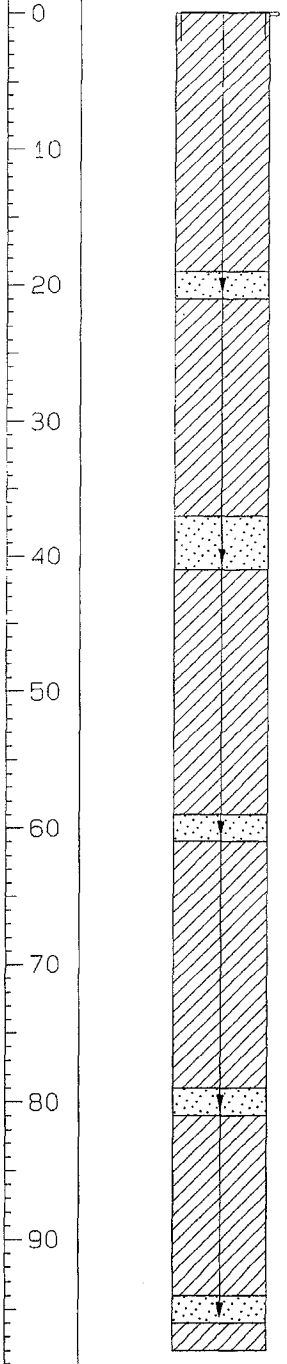
Soil-Vapor Well Completion	Sample No.	Samples	% Recovery	OVA (ppm) Drill Pipe	OVA (ppm) Sample	OVA (ppm) Breath Zn	Lithology	USCS Symbol	Lithologic Description and Notes
								GP/SM	Crushed aggregate fill in tree planter. SILTY SAND (FILL) - Silty fine to medium sand, dark brown, moist, loose, tree roots. Silty fine to medium sand with some coarse sand and trace fine gravel, light orange-brown, slightly moist, medium dense, micaceous.
	VPSS-103		100	0	0	0		SP	SAND - Fine to medium sand with trace coarse sand, orange-brown, moist, dense, micaceous.
									Fine to coarse sand at 13'.
	VPSS-104 VPSS-105		100	0	0	0			Fine to coarse sand with trace silt and fine gravel.
									Occasional pieces of coarse gravel from 22' to 32'.
	VPSS-106		100	0	0	0			*Fine to medium sand with trace coarse sand and trace fine gravel.*
								GP	SANDY GRAVEL - Fine to coarse sandy gravel with cobbles and trace silt, light orange-brown, damp, dense.
									Several small granitic and granodioritic boulders from 35' to 38.5'.
			0	0	-	0			Granitic and dioritic cobbles and small boulders from 39' to 49'.
	VPSS-107		100	0	0	0			Fine sandy gravel with cobbles, orange-brown, slightly moist, very dense, micaceous.
								SP	GRAVELLY SAND - Fine to coarse gravelly fine to coarse sand trace silt and occasional cobbles, orange-brown, slightly moist to moist, dense, micaceous.
	VPSS-108		100	0	0	0			*Fine to coarse sand with fine gravel and small balls of fine sandy silt,* very dense.
									Occasional cobbles from 61' to 67'.
			10	0	-	0		GP	SANDY GRAVEL - Fine to medium sandy fine to coarse gravel with cobbles and trace coarse sand, orange-brown, slightly moist, very dense.
									Alternating thin lenses of gravelly fine to coarse sand with some silt, and fine to coarse sandy gravel with cobbles and boulders, light yellowish-brown to orange-brown to light gray, slightly moist to moist, very dense, micaceous.
									Occasional thin lens fine to medium sand with fine gravel.
									Boulder at 89'. Refusal at 90' (200 blows for 1/2-inch penetration).

FOSTER WHEELER ENVIRONMENTAL CORPORATION

B-22

PROJECT *Jet Propulsion Laboratory*
LOCATION *Seepage Pit No. 12*
GEOLOGIST *B.G. Randolph*
DRILLING CO *Beylik Drilling*
DATE (start/finish) *10-11-94 / 10-12-94*

DRILLING METHOD *Percussion Hammer*
SAMPLING METHOD *2 1/2-inch split-spoon*
SURFACE ELEVATION *1129.0 Feet*
TOTAL DEPTH (ft) *100.5*
DEPTH TO WATER (ft) *Not Encountered*



Depth (ft)	Sample No.	Samples	% Recovery	OVA (ppm) Drill Pipe	OVA (ppm) Sample	OVA (ppm) Breath Zn	Lithology	USCS Symbol	Lithologic Description and Notes
0								GP/SP	Asphalt pavement (3-inches thick). Gravel base for pavement. SAND - Fine to medium sand with some coarse sand, trace silt and fine gravel, orange-brown, slightly moist, medium dense, micaceous.
10	VPSS-109		100	0	0	0			Some fine gravel from 4.5' to 7.5'. Fine to coarse sand with trace fine gravel and silt, dark orange-brown, slightly moist, medium dense, micaceous. Occasional pieces fine gravel from 13' to 20'.
20	VPSS-110 VPSS-111		100	0	0	0			Slighlty moist to moist. Occasional thin lenses fine gravelly sand from 22' to 28'. Occasional pieces coarse gravel from 26' to 28'.
30	VPSS-112		100	0	0	0			Mottled light and dark orange-brown with some fine gravel. Fine gravelly sand from 32' to 33'. Occasional pieces coarse gravel from 33' to 39'. Fine gravelly sand from 37' to 39'.
40			0	0	-	0		GP	Cobbles at 39'. Rock fragments in bit. GRAVEL - Fine to coarse gravel with some sand and numerous cobbles, light yellowish-brown to light orange-brown, damp, very dense, soil matrix is micaceous.
50	VPSS-113		100	0	0	0		SP	SAND - Fine to coarse sand with some fine gravel, orange-brown, moist, very dense, micaceous.
60			20	0	-	0		SP/GP	GRAVELLY SAND - Fine to coarse gravelly fine to medium sand with some silt and cobbles, mottled light to dark orange-brown with some gray-brown, slighlty moist to moist, very dense, trace mica. Granitic rock fragments.
70				0	-	0		GP	COBBLES AND BOULDERS WITH SANDY GRAVEL - Granitic and dioritic cobbles from 63' to 67'. Granitic boulder from 68' to 69.5'. Cobbles and boulders from 70' to 79.5'. Gray-brown sandy silt soil matrix from 73' to 76'. Orange-brown silty sand matrix from 76' to 79.5'.
80				0	-	0			Granitic boulder from 79.5' to 83.5'. Cobbles and boulders from 83.5' to 86.5'. Fine to coarse sand matrix with fine to coarse gravel from 86.5' to 92.5'. Granitic rock fragments with some fine to coarse sandy soil matrix.
90			10	0	-	0		SP/GP	GRAVELLY SAND AND SANDY GRAVEL - Fine gravelly fine to coarse sand with trace silt, and fine sandy fine to coarse gravel with cobbles, dark orange-brown to dark gray-brown, moist, very dense, micaceous.
100			0	0	-	0			

FOSTER WHEELER ENVIRONMENTAL CORPORATION

B-22

PROJECT *Jet Propulsion Laboratory*
LOCATION *Seepage Pit No. 12*
GEOLOGIST *B.G. Randolph*
DRILLING CO *Beylik Drilling*
DATE (start/finish) *10-11-94 / 10-12-94*

DRILLING METHOD *Percussion Hammer*
SAMPLING METHOD *2 1/2-inch split-spoon*
SURFACE ELEVATION *1129.0 Feet*
TOTAL DEPTH (ft) *100.5*
DEPTH TO WATER (ft) *Not Encountered*

Depth (ft)	Soil-Vapor Well Completion	Sample No.	Samples	% Recovery	OVA (ppm) Drill Pipe	OVA (ppm) Sample	OVA (ppm) Breath Zn	Lithology	USCS Symbol	Lithologic Description and Notes
100									SP	
110										
120										
130										
140										
150										
160										
170										
180										
190										
200										

FOSTER WHEELER ENVIRONMENTAL CORPORATION

B-23

PROJECT *Jet Propulsion Laboratory*
LOCATION *Waste Pit Area No.1*
GEOLOGIST *C. Kreller*
DRILLING CO *Beylik Drilling*
DATE (start/finish) *10-17-94 / 10-17-94*

DRILLING METHOD *Percussion Hammer*
SAMPLING METHOD *2 1/2-inch split-spoon*
SURFACE ELEVATION *1094.6 Feet*
TOTAL DEPTH (ft) *20.5*
DEPTH TO WATER (ft) *Not Encountered*

Depth (ft)	Soil-Vapor Well Completion	Sample No.	Samples	% Recovery	OVA (ppm) Drill Pipe	OVA (ppm) Sample	OVA (ppm) Breath Zn	Lithology	USCS Symbol	Lithologic Description and Notes
0									SP	SAND - Fine to medium sand with trace coarse sand, light brown, and loose, micaceous.
			X	20	0	-	0		GP	SANDY GRAVEL - Fine to medium sandy fine to coarse gravel with cobbles, light brown to orange-brown, slightly moist, dense, micaceous.
10			X	10	0	-	0			Dioritic and grantic rock fragments at 5'.
			X							Granitic rock fragmens at 10'. Occasional thin lenses of fine to medium sand from 12' to 18'.
			X	10	0	-	0			Numerous cobbles from 14' to 20'.
			X	10	0	-	0			Granitic rock fragments at 15' and 17'.
20			X	0	0	-	0			Refusal at 20.5' (200 blows for 1/2-inch penetration).
30										
40										
50										
60										
70										
80										
90										
100										

FOSTER WHEELER ENVIRONMENTAL CORPORATION

B-23A

PROJECT *Jet Propulsion Laboratory*
LOCATION *Waste Pit Area No. 1*
GEOLOGIST *C. Kreller*
DRILLING CO *Beylik Drilling*
DATE (start/finish) *10-18-94 / 10-18-94*

DRILLING METHOD *Percussion Hammer*
SAMPLING METHOD *2 1/2-inch split-spoon*
SURFACE ELEVATION *1094.8 Feet*
TOTAL DEPTH (ft) *26.5*
DEPTH TO WATER (ft) *23.5*

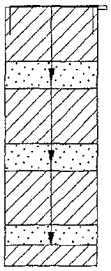
Depth (ft)	Soil-Vapor Well Completion	Sample No.	Samples	% Recovery	OVA (ppm) Drill Pipe	OVA (ppm) Sample	OVA (ppm) Breath Zn	Lithology	USCS Symbol	Lithologic Description and Notes
0		VPSS-123		100	0	0.5	0		SP	SAND - Fine to medium sand with trace coarse sand, light brown, slightly moist, loose, micaceous.
				25	0	-	0		GP	SANDY GRAVEL - Fine to medium sandy fine to coarse gravel, pale yellowish-brown to orange-brown, damp to slighlty moist, very dense, micaceous soil matrix.
10				0	0	-	0			Numerous cobbles and boulders from 8' to 24'. (Sampler bouncing on rock; no penetration.)
20				10	0	0	0			Granitic rock fragments. Static groundwater level.
		VPSS-124		100	0	0	0		SP	SAND - Fine to medium sand with traces of silt and coarse sand, light orange-brown, saturated, medium dense, micaceous.
30										*Terminate boring at 26.5'; groundwater encountered during sampling and stablized at depth of 23.5'*
40										
50										
60										
70										
80										
90										
100										

FOSTER WHEELER ENVIRONMENTAL CORPORATION

B-23B

PROJECT *Jet Propulsion Laboratory*
LOCATION *Waste Pit Area No.1*
GEOLOGIST *C. Kreller*
DRILLING CO *Beylik Drilling*
DATE (start/finish) *10-18-94 / 10-18-94*

DRILLING METHOD *Percussion Hammer*
SAMPLING METHOD *2 1/2-inch split-spoon*
SURFACE ELEVATION *1094.9 Feet*
TOTAL DEPTH (ft) *21*
DEPTH TO WATER (ft) *Not Encountered*

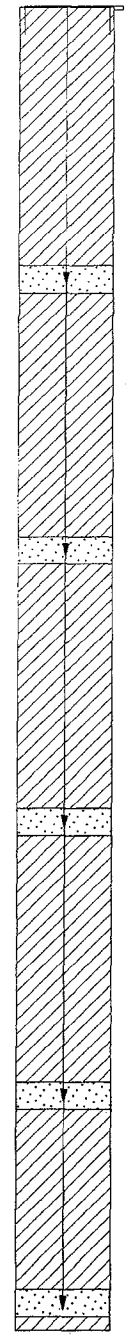
Depth (ft)	Soil-Vapor Well Completion	Sample No.	Samples	% Recovery	OVA (ppm) Drill Pipe	OVA (ppm) Sample	OVA (ppm) Breath Zn	Lithology	USCS Symbol	Lithologic Description and Notes
0									SP	SAND - Fine to medium sand with trace coarse sand, light brown, slightly moist, loose, micaceous.
									GP	SANDY GRAVEL - Fine to medium sandy fine to coarse gravel with numerous small cobbles, light orange-brown, damp to slightly moist, dense, micaceous soil matrix.
				25	0	-	0			
10				0	0	-	0			Granitic rock fragments.
				50	0	-	0			Decomposed granitic rock fragments.
20				20	0	-	0			Fresh granitic rock fragments.
30										
40										
50										
60										
70										
80										
90										
100										

FOSTER WHEELER ENVIRONMENTAL CORPORATION

B-24

PROJECT *Jet Propulsion Laboratory*
LOCATION *Near Seepage Pit No. 15*
GEOLOGIST *B.G. Randolph*
DRILLING CO *Beylik Drilling*
DATE (start/finish) *10-15-94 / 10-15-94*

DRILLING METHOD *Percussion Hammer*
SAMPLING METHOD *2 1/2-inch split-spoon*
SURFACE ELEVATION *1125.0 Feet*
TOTAL DEPTH (ft) *100*
DEPTH TO WATER (ft) *Not Encountered*



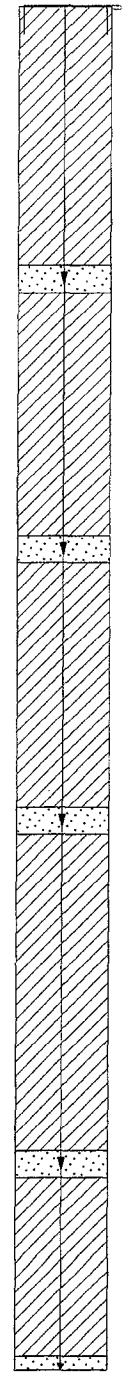
Depth (ft)	Sample No.	Samples	% Recovery	OVA (ppm) Drill Pipe	OVA (ppm) Sample	OVA (ppm) Breath Zn	Lithology	USCS Symbol	Lithologic Description and Notes
0								GP	Crushed aggregate fill in tree planter
								SP	SAND (FILL) - Fine to medium sand with fine to coarse gravel, dark brown, moist, medium dense.
								SP	SAND - Fine to medium sand with some fine gravel, dark orange-brown, slightly moist, medium dense, micaceous.
10	VPSS-117		100	0	0	0			Occasional pieces coarse gravel from 7' to 9'.
									Fine to coarse sand with some fine gravel, light orange-brown, damp to slightly moist.
									Fine to medium sand with some coarse sand and trace silt and fine gravel, dark orange-brown, moist.
20	VPSS-118		100	0	0	0			Fine to coarse sand with some silt and fine gravel.
									Occasional pieces coarse gravel from 23' to 27'.
									Small cobbles at 27'.
30	VPSS-119		100	0	0	0			*Fine to medium sand with trace silty fine sand, dark orange-brown to dark brown, dense.*
								SP GP	SAND AND GRAVELLY SAND - Alternating thin lenses of fine to coarse sand with trace silt and fine gravel, and fine gravelly fine to coarse sand; light to dark orange-brown, moist, dense, micaceous.
40			0	0	-	0		GP	SANDY GRAVEL - Fine to coarse sandy fine to coarse gravel with cobbles, light orange-brown to dark orange-brown, moist, dense to very dense, micaceous.
								ML	SILT - Fine sandy silt with trace clay, dark orange-brown, moist, firm, micaceous.
								SP GP	SANDY GRAVEL AND GRAVELLY SAND - Fine to coarse sandy fine gravel with some coarse gravel and trace silt, and fine to coarse sand with some gravel; orange-brown, moist, very dense, micaceous.
50	VPSS-120		100	0	0	0		SP	SAND - Fine to coarse sand with trace silt and fine gravel, orange-brown, moist, dense, micaceous.
									Occasional small cobbles from 52' to 58'.
60	VPSS-121		75	0	0	0			Fine to medium sand with some fine gravel and trace silt.
								GP	SANDY GRAVEL - Fine to coarse sandy fine and coarse gravel with cobbles, orange-brown, slightly moist to moist, very dense, micaceous.
70	VPSS-122		100	0	0	0		SP	SAND - Fine to coarse sand with some fine gravel and trace silt, orange-brown, moist, micaceous.
									Numerous cobbles from 76' to 79'.
								SP GP	
80			30	0	0	0			Granitic rock fragments with trace silty fine sand.
								GP	SANDY GRAVEL, COBBLES AND BOULDERS - Sandy fine to coarse gravel with cobbles and small boulders, light yellowish-brown to pale gray-brown to orange-brown, slightly moist, very dense.
									Numerous cobbles and small boulders from 87' to 92'.
90			20	0	-	0			Fresh and decomposed granitic rock fragments.
									Granitic Boulder from 92' to 94'.
									Alternating thin lenses gravelly fine to medium sand and sandy gravel and cobbles from approximately 94' to 97'.
100									Cobbles and boulders from 97' to 100'.

FOSTER WHEELER ENVIRONMENTAL CORPORATION

B-25

PROJECT *Jet Propulsion Laboratory*
LOCATION *Seepage Rt Nos. 20 & 21*
GEOLOGIST *B.G. Randolph*
DRILLING CO *Boart Longyear*
DATE (start/finish) *3-29-97 / 3-31-97*

DRILLING METHOD *Sonic*
SAMPLING METHOD *Continuous 6-inch Core & Grab*
SURFACE ELEVATION *1199.6 Feet*
TOTAL DEPTH (ft) *202*
DEPTH TO WATER (ft) *199.9*



Depth (ft)	Sample No.	Samples	% Recovery	OVA (ppm) Drill Pipe	OVA (ppm) Sample	OVA (ppm) Breath Zn	Lithology	USCS Symbol	Lithologic Description and Notes
0								GP	ASPHALT pavement (3 inches thick).
								GP	GRAVEL base for pavement
				0	26	0		SP GP	GRAVELLY SAND (FILL) – Fine to coarse gravelly fine to coarse sand with coarse sand with trace silt and occasional small cobbles, dark brown, slightly moist, micaceous.
10				0.8	29	0			Large cobbe at 7.5' ft.
				–	36	–			GRAVELLY SAND AND SANDY GRAVEL – Alternating thin lenses of fine gravelly fine to coarse sand with trace silt and fine to coarse sand fine to coarse gravel with small cobbles, pale orange-brown to dark orange-brown with some gray-brown mottling, slightly moist.
								SP	Small cobbles from 13.5' to 15'.
20				0.2	23	0			Large cobble at 15'.
				–	17	–			SAND – Fine to coarse sand with fine gravel, trace silt and occasional pieces of coarse gravel, orange-brown, slightly moist to moist, micaceous.
									Thin lens of fine sand with some silt at 22.5'.
30				–	17	–			Thin lens of fine to medium sand with some silt at 25'.
									Fine to medium sand with some coarse sand and silt, (dark orange-brown and moist) from 29.5' to 34.5'.
				0	16	0			Small cobble at 35.5'.
40				0	51	0		SM	SILTY SAND – Silty fine to medium sand with some coarse sand and occasional pieces of fine gravel, dark orange-brown, moist, micaceous.
									Thin lens of fine to coarse sand with some fine gravel and trace silt at 39.5'.
				0	37	0		SP SM	SAND, GRAVELLY SAND AND SILTY SAND – Interbedded lenses of fine to medium sand with some coarse sand and silt, fine gravel and fine to coarse sand with some silt, and silty fine to medium sand with some coarse sand and occasional pieces of fine gravel, dark orange-brown, moist to very moist, micaceous.
50				0	53	0			
				0	19	0		SP	SAND – Fine to medium sand with coarse sand, some silt and fine gravel, dark orange-brown, moist, micaceous.
									Thin lens of silt, fine sand with some medium sand at 55.5'.
60				0	44	0			Fine to coarse sand with some fine gravel and trace silt from 58' to 60.5'.
	G-12		100	0	37	0		SM	SILTY SAND – Silty fine to medium sand with trace coarse sand, dark orange-brown with some occasional gray-brown mottling, moist, micaceous.
70				0	46	0		SP	SAND – Fine to coarse sand with fine to coarse gravel and trace silt, orange-brown, slightly moist, micaceous.
									Occasional small cobbles from 68' to 76'.
				0	53	0			Fine to medium sand from 71' to 72'.
									Gravelly sand from 72.5' to 74'.
									Granitic boulder at 74'.
80				0	36	0			Alternating thin lenses of fine sand with some silt, fine to medium sand, and fine to coarse sand with some fine to coarse gravel from 76' to 84.5'.
				0	55	0			Gravelly fine to coarse sand from 85' to 86'.
									Thin lens of fine sand with silt at 86', very micaceous.
90				0	42	0			Mottled gray-brown, orange-brown and reddish-brown from 89' to 90'.
									Thin lens of silt and fine to medium sand at 91', dark reddish-brown.
	G-13		100	0	31	0		SM	SILTY SAND – Silty, fine to medium sand with some coarse sand and occasional pieces of fine gravel, dark reddish-brown, moist, micaceous.
100				0	52	0			

FOSTER WHEELER ENVIRONMENTAL CORPORATION

B-25

PROJECT *Jet Propulsion Laboratory*
LOCATION *Seepage Pit Nos. 20 & 21*
GEOLOGIST *B.G. Randolph*
DRILLING CO *Boart Longyear*
DATE (start/finish) *3-29-97 / 3-31-97*

DRILLING METHOD *Sonic*
SAMPLING METHOD *Continuous 6-inch Core & Grab*
SURFACE ELEVATION *1199.6 Feet*
TOTAL DEPTH (ft) *202*
DEPTH TO WATER (ft) *199.9*

Depth (ft)	Soil-Vapor Well Completion	Sample No.	Samples	% Recovery	OVA (ppm) Drill Pipe	OVA (ppm) Sample	OVA (ppm) Breath Zn	Lithology	USCS Symbol	Lithologic Description and Notes
100									SM/SP	SAND – Fine to coarse sand with fine to coarse gravel and some silt, light orange-brown to orange-brown, moist, micaceous.
					0	20	0			Cobbles from 102' to 103'.
										Large cobble at 108.5.
110					0.1	20	0		SP/SM	SAND AND SILTY SAND – Alternating lenses of fine to coarse sand with fine to coarse gravel and trace silt, and silty fine to medium sand with some coarse gravel and occasional pieces of fine gravel, light orange-brown to dark orange-brown, slightly moist to moist, micaceous.
					–	16	–			
									SP	Small cobbles at 113'.
120					0	26	0			SAND – Fine to coarse sand with some fine to coarse gravel and trace silt, orange-brown to dark orange-brown, slightly moist to moist.
										Small boulder at 119'.
		G-14	⊠	100	0	13				Occasional small cobbles from 122' to 125'.
										Gravelly sand from 124' to 125'.
130					0	22	0			Lens of fine sand with silt, dark orange-brown, moist from 125' to 126'.
										Gravelly fine to coarse sand from 128.5' to 129.5'.
					–	25	–			Numerous small cobbles from 129' to 140'.
										Lens of gravelly fine to coarse sand with small cobbles from 136' to 137'.
140					0.2	12	0			
										Thin lens of fine sand with some silt at 141.5', very micaceous.
					0.2	30	0			Occasional pieces of fine gravel from 144.5' to 152'.
										Lens of fine to coarse sand with fine gravel from 146.5' to 147.5'.
150					–	20	–			Occasional thin lenses of silty fine sand with some silt and medium sand from 149' to 155.5'.
					0	20	0			
										Small cobble at 158'.
160					0	13	0		SM	SILTY SAND – Silty fine sand with some medium sand, dark orange-brown, moist, very micaceous.
					0	32	0		SP/GP	SAND – Fine to coarse sand with fine to coarse gravel and trace silt, orange-brown to dark orange-brown, moist.
										SANDY GRAVEL – Fine to coarse sandy fine to coarse gravel with cobbles, mottled gray-brown and light to dark orange-brown, slightly moist to moist.
170					0	35	0			
									SP	GRAVELLY SAND – Fine to coarse gravelly fine to coarse sand with some silt, orange-brown with some gray-brown mottling, slighty moist to moist.
					0	24	0		SP/GP	GRAVELLY SAND AND SANDY GRAVEL – Alternating lenses of fine to coarse gravelly fine to coarse sand with trace silt and fine to coarse sandy fine to coarse gravel with small cobbles, pale orange-brown to orange-brown with some gray-brown and pale gray to green mottling, slightly moist to moist, micaceous.
180					0	37	0			
									SP	SAND – Fine to medium sand with some coarse sand and orange-brown, slightly moist to moist, micaceous.
					0	58	0			Thin lens of silty, fine to medium sand, orange-brown with pale greenish-gray silt laminations at 191'.
190					0	19	0			
									SP/GP	GRAVELLY SAND AND SANDY GRAVEL – Alternating lenses of fine to coarse gravelly fine to coarse sand with trace silt and fine to coarse sandy fine to coarse gravel with small cobbles, light orange-brown with some gray-brown with light green-gray mottling, slightly moist to moist, some mica.
					0	29	0			
200					–	23	–			Very moist from 198' to 199'.

FOSTER WHEELER ENVIRONMENTAL CORPORATION

B-25

PROJECT *Jet Propulsion Laboratory*
LOCATION *Seepage Pit Nos. 20 & 21*
GEOLOGIST *B.G. Randolph*
DRILLING CO *Boart Longyear*
DATE (start/finish) *3-29-97 / 3-31-97*

DRILLING METHOD *Sonic*
SAMPLING METHOD *Continuous 6-inch Core & Grab*
SURFACE ELEVATION *1199.6 Feet*
TOTAL DEPTH (ft) *202*
DEPTH TO WATER (ft) *199.9*

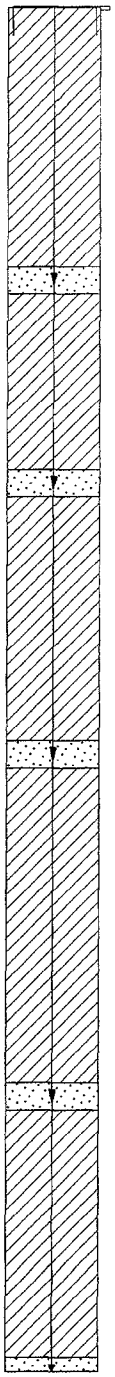
Depth (ft)	Soil-Vapor Well Completion	Sample No.	Samples	% Recovery	OVA (ppm) Drill Pipe	OVA (ppm) Sample	OVA (ppm) Breath Zn	Lithology	USCS Symbol	Lithologic Description and Notes
200									SP/GP	Cobbles with sand and some silt from 199' to 200'. Very moist at 200'. Wet at 201'. Total Depth = 202'. Water level at 199.9'.
210										
220										
230										
240										
250										
260										
270										
280										
290										
300										

FOSTER WHEELER ENVIRONMENTAL CORPORATION

B-26

PROJECT *Jet Propulsion Laboratory*
LOCATION *Aero Road near SE cor. Bldg. 79*
GEOLOGIST *B.G. Randolph*
DRILLING CO *Boart Longyear*
DATE (start/finish) *3-25-97 / 3-27-97*

DRILLING METHOD *Sonic*
SAMPLING METHOD *Continuous 6-inch Core & Grab*
SURFACE ELEVATION *1201.8 Feet*
TOTAL DEPTH (ft) *206*
DEPTH TO WATER (ft) *202.5*



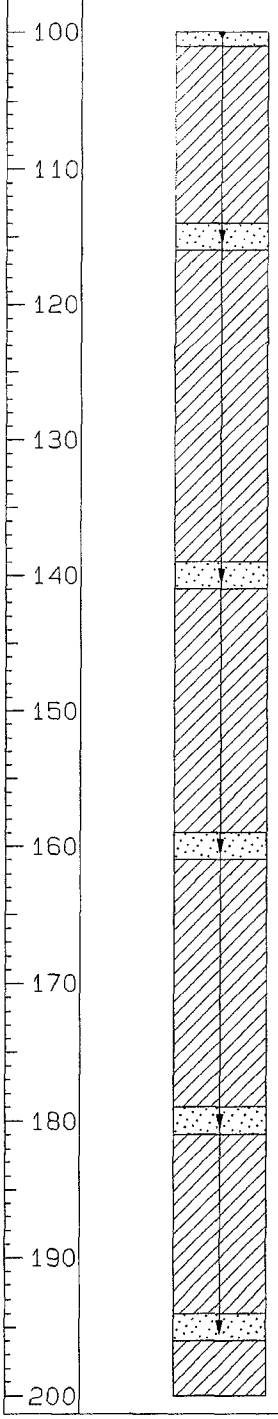
Depth (ft)	Sample No.	Samples	% Recovery	OVA (ppm) Drill Pipe	OVA (ppm) Sample	OVA (ppm) Breath Zn	Lithology	USCS Symbol	Lithologic Description and Notes
0									ASPHALT pavement (4.5 inches thick).
								GP	GRAVEL base for pavement
				0.2	16	0		GP/SP	GRAVELLY SAND (FILL) - Fine gravelly fine to medium sand with some coarse sand and occasional pieces of coarse gravel, dark orange-brown, slightly moist.
10				-	35	-		SM/SP	SAND - Fine to medium sand with some coarse sand and trace silt, occasional pieces of coarse gravel, dark gray-brown, moist.
									Small cobbles at 7'.
				-	34	-			SILTY SAND - Silty fine to coarse sand with some fine gravel, dark orange-brown, moist, micaceous.
20				2.1	65	1.9			Small cobble at 16'.
				0	59	0			Small cobbles from 23' to 24'.
									Moist to very moist from 26' to 28'.
30				0	62	0			*Silty fine to medium sand with coarse sand and some fine gravel, dark* orange-brown, very moist, micaceous, from 28' to 29.5'.
				0	110	0		SM/SP	SILTY SAND AND SAND - *Interbedded lenses of dark orange-brown,* silty fine to medium sand with trace coarse sand and fine gravel, and orange-brown fine to coarse sand with fine to coarse gravel; moist to very moist, micaceous.
40				0	41	0		SP	SAND - *Fine to medium sand with coarse sand and some fine gravel,* occasional pieces of coarse gray, orange-brown, very moist, micaceous.
				0	33	0			
				-	106	-		SP/SM	SAND WITH SILT - *Fine to medium sand with silt, some coarse sand, and* occasional pieces of coarse gravel; dark orange-brown, moist, micaceous.
50								SP	SAND - Fine to coarse sand with fine gravel, some silt, and occasional pieces coarse gravel; orange-brown, moist, micaceous.
				-	60	-			Cobble at 56'.
60	G-9	⊠	100	0	59	0		SP/SM/SP	SAND WITH SILT - Fine sand with some medium sand and silt, and occasional pieces gravel, trace coarse sand; dark orange-brown with some bright orange-brown mottling, moist, micaceous.
				0	34	0			SAND - Fine to medium sand with some coarse sand, orange-brown, slightly moist to moist, very micaceous.
									Trace silt, some fine to coarse gravel from 62' to 70'.
70				0	62	1.1			Fine sand with some medium sand and silt, dark orange-brown from 64' to 66.5'
								SM/SP	SILTY SAND - Silty fine to medium sand, dark orange-brown, moist, very micaceous.
				0	31	0.4			SAND - Fine to coarse sand with fine gravel and occasional pieces of coarse gravel, orange-brown, slightly moist to moist, micaceous.
80				0	64	0			Occasional cobbles from 71.5' to 79'.
									Fine sand with some silt, very micacaceous from 77.5' to 79'.
				0	17	0			Fine to medium sand with some silt and trace coarse sand from 79.5' to 81'.
									Large cobble at 85.5'.
90				0	25	0			Gravelly sand from 87' to 91.5'.
				0	26	0			Occasional small cobbles from 93' to 98.5' and fine to coarse sand with fine to coarse gravel and some silt from 93.5' to 99'.
100				0	26	0			

FOSTER WHEELER ENVIRONMENTAL CORPORATION

B-26

PROJECT *Jet Propulsion Laboratory*
LOCATION *Aero Road near SE cor. Bldg. 79*
GEOLOGIST *B.G. Randolph*
DRILLING CO *Boart Longyear*
DATE (start/finish) *3-25-97 / 3-27-97*

DRILLING METHOD *Sonic*
SAMPLING METHOD *Continuous 6-inch Core & Grab*
SURFACE ELEVATION *1201.8 Feet*
TOTAL DEPTH (ft) *206*
DEPTH TO WATER (ft) *202.5*



Depth (ft)	Sample No.	Samples	% Recovery	OVA (ppm) Drill Pipe	OVA (ppm) Sample	OVA (ppm) Breath Zn	USCS Symbol	Lithologic Description and Notes
100							SP	Fine to coarse sand with some silt, dark orange-brown from 99' to 100'.
	G-10		100	0	42	0		Coarse gravel and small cobbles from 102' to 103'.
							SP GP	GRAVELLY SAND - Fine to coarse gravelly fine to coarse sand with trace silt, pale yellow-brown to orange-brown, slightly moist, trace mica.
110				0	48	0		*Occasional small cobbles from 107' to 110'.*
							SP	Large cobble at 110'.
				0	60	0		SAND - Fine to coarse sand with fine to coarse gravel and trace silty, pale yellow-brown to light orange-brown, slightly moist, micacous.
120				0	18	0		Orange-brown at 114'.
								Small cobbles at 119'.
								Large cobble at 123'.
				0	36	0		Thin lens of fine to medium sand with some silt, moist at 124.5'.
							GP	SANDY GRAVEL - Fine to coarse sandy fine to coarse gravel, with some small cobbles and trace silt, pale yellow-brown to light orange-brown, slightly moist, micaceous.
130				0	32	0		
							SP	SAND - Fine to coarse sand with some fine gravel and trace silt, occasional pieces of coarse gravel, orange-brown, slightly moist to moist, micaceous.
				0	36	0		
							SP GP	GRAVELLY SAND AND SANDY GRAVEL - Alternating thin lenses of fine gravelly fine to coarse sand and fine to coarse sandy fine to coarse gravel, light orange-brown to orange-brown, slightly moist, micaceous.
140				0	45	0		Occasional small cobbles from 138' to 145'.
				-	34	-		
	G-11		100				SP	SAND - Fine to medium sand, some coarse sand , and trace silt, and occasional pieces fine gravel, orange-brown, slightly moist to moist, micaceous.
150				0.1	43	0		Fine to coarse sand with fine to coarse gravel and trace silt from 149' to 151'.
				0	36	0		Fine to medium sand with some silt, trace coarse sand and occasional pieces of fine gravel, very micaceous from 157.5' to 158.5'.
								Fine to coarse sand with fine to coarse gravel from 158.5' to 160'.
160				0	41	0		Occasional thin lenses of silty fine sand from 160' to 162'.
								Fine to coarse sand with fine to coarse gravel and trace silt, slightly moist from 162' to 167'.
				0	23	0		
							SM	SILTY SAND - Silty fine to coarse sand with trace fine gravel, mottled orange-brown and light gray-brown, moist, micaceous.
170				0	10	0	GP	SANDY GRAVEL - Fine to coarse sand and fine to coarse gravel with some cobbles and some silt, pale gray-brown to dark orange-brown, slightly moist.
				0	11	0	SP	GRAVELLY SAND - Fine to coarse gravelly fine to coarse sand with trace silt, orange-brown with some gray-brown mottling, moist, some mica.
							SP GP	GRAVELLY SAND AND SANDY GRAVEL - Alternating lenses of fine to coarse gravelly fine to coarse sand with trace silt and fine to coarse sandy fine to coarse gravel with cobbles, pale orange-brown to orange-brown with some pale gray-brown mottling, slightly moist to moist, micaceous.
180				0	26	0		
				0	28	0	SP	SAND - Fine to coarse sand with some fine gravel and trace silt, orange-brown, moist, micaceous.
190				0	36	0		
							SM	SILTY SAND - Silt fine sand with trace medium sand and occasional pieces coarse sand, dark orange-brown, slightly moist, very micaceous.
				0	25	0	SP GP	GRAVELLY SAND AND SANDY GRAVEL - Alternating lenses of fine to coarse gravelly fine to coarse sand with trace silt and fine to coarse sandy fine to coarse gravel with small cobbles, light orange-brown with trace green-gray mottling, slighty moist to moist, some mica.
200				0	9	0		

FOSTER WHEELER ENVIRONMENTAL CORPORATION

B-26

PROJECT *Jet Propulsion Laboratory*
LOCATION *Aero Road near SE cor. Bldg. 79*
GEOLOGIST *B.G. Randolph*
DRILLING CO *Boart Longyear*
DATE (start/finish) *3-25-97 / 3-27-97*

DRILLING METHOD *Sonic*
SAMPLING METHOD *Continuous 6-inch Core & Grab*
SURFACE ELEVATION *1201.8 Feet*
TOTAL DEPTH (ft) *206*
DEPTH TO WATER (ft) *202.5*

Depth (ft)	Soil-Vapor Well Completion	Sample No.	Samples	% Recovery	OVA (ppm) Drill Pipe	OVA (ppm) Sample	OVA (ppm) Breath Zn	Lithology	USCS Symbol	Lithologic Description and Notes
200									SP GP	Very moist from 198.5' to 202'. Large granitic cobble at 202'. Wet at 202.5' Total Depth = 206'. Water level at 202.5'.
210										
220										
230										
240										
250										
260										
270										
280										
290										
300										

FOSTER WHEELER ENVIRONMENTAL CORPORATION

B-27

PROJECT Jet Propulsion Laboratory
LOCATION Parking lot north of Bldg. 288
GEOLOGIST B.G. Randolph
DRILLING CO Boart Longyear
DATE (start/finish) 3-15-97 / 3-18-97

DRILLING METHOD Sonic
SAMPLING METHOD Continuous 6-inch Core & Grab
SURFACE ELEVATION 1214.2 Feet
TOTAL DEPTH (ft) 214
DEPTH TO WATER (ft) 210.9

Depth (ft)	Soil-Vapor Well Completion	Sample No.	Samples	% Recovery	OVA (ppm) Drill Pipe	OVA (ppm) Sample	OVA (ppm) Breath Zn	Lithology	USCS Symbol	Lithologic Description and Notes
0									GP	ASPHALT pavement (4.5 inches thick).
									SP	GRAVEL base for pavement.
					0	16	0			SAND (FILL) - Fine to coarse sand with fine gravel and trace silt, mottled dark gray-brown and dark orange-brown, moist, micaceous.
10					0	22	0.5		SP	SAND - Fine to coarse sand with some silt and fine gravel, dark orange-brown, slightly moist.
										Small granitic boulder at 12'.
					0	70	0		SP SM	SAND AND SILTY SAND - Alternating thin lenses fine to coarse sand with silt and fine gravel and silty fine to medium sand with some fine gravel, occasional pieces coarse gravel, and small cobbles, orange-brown to dark orange-brown, slightly moist to moist, micaceous.
20					0	22	0		SP	SAND - Fine to coarse sand with fine gravel and trace silt, occasional pieces coarse gravel, orange-brown, slightly moist.
					0	23	0			Occasional cobbles and small boulders from 21.5' to 25'.
30					0	45	0		GP	GRAVELLY SAND - Fine gravelly fine to coarse sand with occasional pieces coarse gravel, gray-brown to orange-brown, slightly moist, micaceous.
		G-4		100	-	59	-		SM	SILTY SAND - Silty fine to medium sand with trace coarse sand, dark orange-brown, moist, micaceous.
40					-	17	-		SP SM	SAND AND SILTY SAND - Alternating thin lenses fine to medium sand with silt and silty fine to medium sand, dark ornge-brown, moist, micaceous.
					0	18	0		SP	SAND - Fine to medium sand with coarse sand and some silt, orange-brown, moist, micaceous.
50					0	246	0		SP SM	SAND AND SILTY SAND - Alternating thin lenses fine to coarse sand with some silt and silty fine to medium sand with some coarse sand, occasional pieces fine gravel, dark orange- brown, moist.
					-	-	-		SP	SAND - Fine to coarse sand with silt and fine to coarse gravel, dark orange-brown, moist, micaceous.
60					0	120	0			
					0	103	0		GP GM	GRAVELLY SAND - Fine to coarse gravelly fine to coarse sand with silt; mottled dark orange-brown, pale orange-brown, brownish-gray; slightly moist to moist, micaceous.
									SP	SAND - Fine to coarse sand with fine to coarse gravel and some silt, dark orange-brown, moist, micaceous.
70					0	91	0		GP GM SP	GRAVELLY SAND - Fine to coarse gravelly fine to coarse sand with some silt, mottled dark orange-brown and pale orange-brown, moist.
		G-5		100						
					0	71	0			SAND - Fine to coarse sand with silt and fine to coarse gravel, dark orange-brown, moist, micaceous.
80					0	82	0		SP GP	SAND - Alternating thin lenses fine to coarse sand with some silt and fine to coarse gravelly sand with trace silt, mottled light to dark orange-brown, with some light gray-brown, slightly moist to moist.
					0	156	0		SP	SAND - Fine to coarse sand with some fine gravel and trace silt, dark brown, slightly moist.
										Small cobble at 85'.
90					0	101	0			
		G-6		100	0	48	0		SM	SILTY SAND - Silty fine sand with trace clay, dark reddish-brown, mottled with whitish specs, moist.
100					0	154	0		SP	SAND - Fine to coarse sand with some silt and fine gravel, orange-brown, slightly moist.

FOSTER WHEELER ENVIRONMENTAL CORPORATION

B-27

PROJECT *Jet Propulsion Laboratory*
LOCATION *Parking lot north of Bldg. 288*
GEOLOGIST *B.G. Randolph*
DRILLING CO *Boart Longyear*
DATE (start/finish) *3-15-97 / 3-18-97*

DRILLING METHOD *Sonic*
SAMPLING METHOD *Continuous 6-inch Core & Grab*
SURFACE ELEVATION *1214.2 Feet*
TOTAL DEPTH (ft) *214*
DEPTH TO WATER (ft) *210.9*

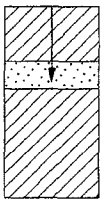
Depth (ft)	Soil-Vapor Well Completion	Sample No.	Samples	% Recovery	OVA (ppm) Drill Pipe	OVA (ppm) Sample	OVA (ppm) Breath Zn	Lithology	USCS Symbol	Lithologic Description and Notes
100									SP	Occasional cobbles from 98' to 106.5'.
					0	55	0			
110					0	56	0			Fine to coarse sand with fine to coarse gravel and trace silt.
					0	57	0			Occasional small cobbles from 112' to 128'.
120					-	290	-			Granitic boulder at 119'.
										Thin lens silty fine to medium sand with some coarse sand at 121.5'.
		G-7	⊠	100	-	-	-			
130					0	59	0			Thin lens silty fine to medium sand at 130'.
										Large granitic cobble at 132'.
					0	25	0			Large granitic cobble at 134.5'.
										Large cobble at 138'.
140					-	14	-			Small granitic boulder at 142'.
					0	19	0			Thin lens gravelly sand at 145.5'.
150					-	29	-		SP GP	GRAVELLY SAND - Fine to coarse gravelly fine to coarse sand with numerous small cobbles and trace silt, mottled light gray-brown and orange-brown, slightly moist, micaceous.
					0	23	0		SM SP	SILTY SAND -Silty fine sand with some medium sand, dark orange-brown, slightly moist, micaceous.
160					0	52	0			SAND - Fine to coarse sand with fine to coarse gravel and trace silt, dark orange-brown, slightly moist, micaceous.
					-	57	-			Small cobble at 164'.
										Dark orange-brown to reddish brown and moist at 166'.
170					0	50	0			
					0	30	0		ML SP SP GP	SILT - Fine sandy silt, dark orange-brown to dark reddish-brown, moist, micaceous. SAND - Fine to medium sand with some coarse sand and occasional pieces fine gravel, orange-brown, slightly moist, micaceous to 174.5'. GRAVELLY SAND AND SANDY GRAVEL - Alternating lenses coarse gravelly fine to coarse sand with trace silt and fine to coarse sandy fine to coarse gravel with small cobbles, orange-brown and dark orange-brown, slightly moist to moist, trace mica.
180					0	33	0		SP	
					0	30	0			SAND - Fine to medium sand with fine to coarse gravel and some silt, light to dark orange-brown with some pale green-gray and light gray mottling, slightly moist to moist.
190		G-8	⊠	100	0	25	0			Occasional small cobbles from 182' to 187.5'.
										Fine to coarse sand with fine to coarse gravel and some silt, dark orange-brown, slightly moist to moist, micaceous.
					0	32	0			Large granitic cobble at 192.5'. Gravelly sand lens from 192.5' to 193.5'.
										Small cobbles at 194.5'.
200					0	25	0			Numerous pieces coarse gravel from 197' to 199'.

FOSTER WHEELER ENVIRONMENTAL CORPORATION

B-27

PROJECT *Jet Propulsion Laboratory*
LOCATION *Parking lot north of Bldg. 288*
GEOLOGIST *B.G. Randolph*
DRILLING CO *Boart Longyear*
DATE (start/finish) *3-15-97 / 3-18-97*

DRILLING METHOD *Sonic*
SAMPLING METHOD *Continuous 6-inch Core & Grab*
SURFACE ELEVATION *1214.2 Feet*
TOTAL DEPTH (ft) *214*
DEPTH TO WATER (ft) *210.9*

Depth (ft)	Soil-Vapor Well Completion	Sample No.	Samples	% Recovery	OVA (ppm) Drill Pipe	OVA (ppm) Sample	OVA (ppm) Breath Zn	Lithology	USCS Symbol	Lithologic Description and Notes
200									SP	
					0	25	0			Occasional small cobbles from 199' to 207'.
210										Thin lens gravelly sand at 210.5'.
										Small granitic boulder at 212', wet. Core saturated at 212'.
										Total Depth =214'. Groundwater at 210.9'.
220										
230										
240										
250										
260										
270										
280										
290										
300										

FOSTER WHEELER ENVIRONMENTAL CORPORATION

B-28

PROJECT *Jet Propulsion Laboratory*
LOCATION *SW cor. Bldg. 18*
GEOLOGIST *B.G. Randolph*
DRILLING CO *Boart Longyear*
DATE (start/finish) *3-11-97 / 3-13-97*

DRILLING METHOD *Sonic*
SAMPLING METHOD *Continuous 6-inch Core & Grab*
SURFACE ELEVATION *1176.7 Feet*
TOTAL DEPTH (ft) *179*
DEPTH TO WATER (ft) *171.5*

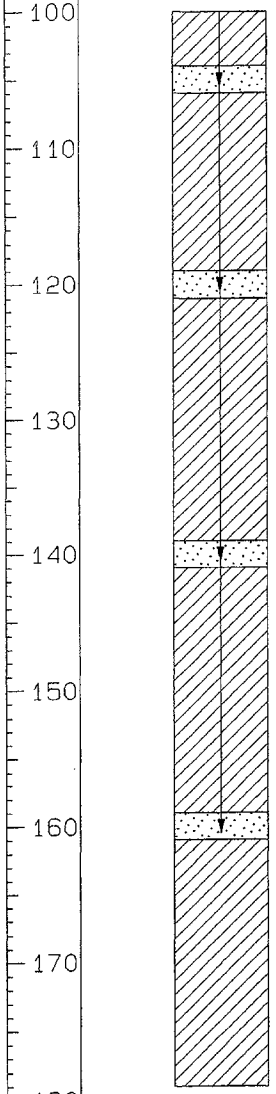
Depth (ft)	Soil-Vapor Well Completion	Sample No.	Samples	% Recovery	OVA (ppm) Drill Pipe	OVA (ppm) Sample	OVA (ppm) Breath Zn	Lithology	USCS Symbol	Lithologic Description and Notes
0									GP	ASPHALT pavement (3 inches thick).
									GP	GRAVEL base for pavement.
					–	13	–		SP	SAND – Fine to coarse sand with fine gravel and occasional pieces coarse gravel, trace silt, light gray-brown, slightly moist.
10					–	0	–			Occasional thin lenses silty medium sand, dark orange-brown, moist from 10.5' to 12'.
					15	52	0			Light orange-brown, less silty.
										Fine to medium sand with some coarse sand, occasional pieces fine gravel, light orange-brown, slightly moist at 13.5'.
20					–	–	–			Dark orange-brown at 15'.
					7	30	0			Lens of silty fine to medium sand with trace coarse gravel from 12.5' to 13.5'.
										Fine to medium sand with some coarse sand and trace fine gravel, orange-brown, slightly moist.
30					–	–	–			Occasional pieces coarse gravel and trace silt.
									SM	SILTY SAND – Silty fine to medium sand, dark orange-brown to gray-brown, moist, micaceous.
					0	53	0			Silty fine to medium sand with trace coarse sand and occasional pieces fine gravel, orange-brown.
40		G-1		100	–	–	–			
									SM	SILTY SAND AND SANDY SILT – Alternating thin lenses of silty fine sand with some medium sand and fine sandy silt with trace medium sand, dark orange-brown, moist to very moist, micaceous.
					2	66	0		ML	
									SP	SAND – Fine to coarse sand with fine to coarse gravel with trace silt, light orange-brown, slightly moist, micaceous.
									GP	
50					0	67	0			GRAVELLY SAND – Gravelly fine to coarse sand with occasional small cobbles, mottled light orange-brown and light gray-brown, slightly moist.
					–	–	–		SP	Large cobble at 48'.
										Small granodiorite boulder at 51'.
60					0	51	0			SAND – Fine to coarse sand with fine gravel and occasional pieces coarse gravel, orange-brown, slightly moist, micaceous.
					0	–	0			
70					0	–	0			Cobble at 68.5'.
										Occasional pieces fine gravel.
					0	16	0			Fine to coarse gravel from 73' to 74'.
										With fine to coarse gravel.
80					0	42	0		GP	GRAVELLY SAND – Fine to coarse gravelly fine to coarse sand with occasional small cobbles, orange-brown, slightly moist, micaceous.
					0	42	0		SP	SAND – Medium to coarse sand with some fine sand and occasional pieces fine gravel, orange-brown, slightly moist, trace mica.
90					0	47	0			Occasional thin lenses fine to coarse gravel and sand from 86.5' to 90.5'.
										Occasional pieces coarse gravel from 92.5' to 95'.
					0	27	0			Thin lens fine sand and silt at 95.5'.
										Occasional small cobbles from 97' to 99'.
100					0	47	0			

FOSTER WHEELER ENVIRONMENTAL CORPORATION

B-28

PROJECT Jet Propulsion Laboratory
LOCATION SW cor. Bldg. 18
GEOLOGIST B.G. Randolph
DRILLING CO Boart Longyear
DATE (start/finish) 3-11-97 / 3-13-97

DRILLING METHOD Sonic
SAMPLING METHOD Continuous 6-inch Core & Grab
SURFACE ELEVATION 1176.7 Feet
TOTAL DEPTH (ft) 179
DEPTH TO WATER (ft) 171.5



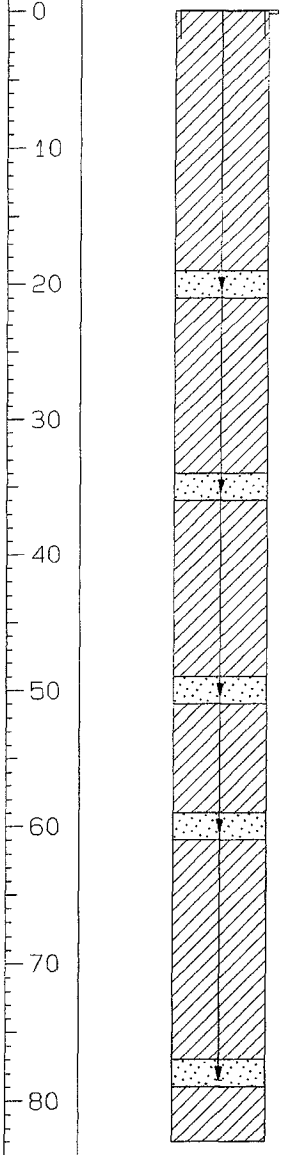
Depth (ft)	Sample No.	Samples	% Recovery	OVA (ppm) Drill Pipe	OVA (ppm) Sample	OVA (ppm) Breath Zn	Lithology	USCS Symbol	Lithologic Description and Notes
100								SP	Thin lens of silty fine sand at 102.5'.
				0	93	0			Alternating thin lenses gravelly sand with small cobbles and fine to coarse sand with fine gravel from 103.5'to 105'.
110				0	84	0			Mottled light gray and dark orange-brown from 111' to 112'.
	G-2	⋈	100	0	26	0			Fine to coarse sand with some silt and fine gravel, dark orange-brown, moist to very moist, micaceous.
								SM	SILTY SAND - Silty fine to medium sand with some coarse sand and occasional pieces of fine to coarse gravel, dark orange-brown, moist to very moist, micaceous.
120				0	86	0			
								SP	SAND AND SILTY SAND - Alternating thin lenses of fine to medium sand with coarse sand, some silt and fine gravel, and silty fine to medium sand with trace coarse sand and fine gravel; orange-brown to dark orange-brown, moist to very moist, occasional pieces coarse gravel, micaceous.
								SM	
				0	70	0		SP	
130				0	43	0			SAND - Fine to medium sand with some coarse sand and trace silt, light orange-brown, slightly moist, micaceous.
								SM	SILTY SAND - Silty fine sand, dark orange-brown, slightly moist, micaceous.
				0	27	0			
								GP	GRAVELLY SAND - Fine to coarse gravelly fine to coarse sand with cobbles and trace silt, mottled light gray and orange-brown, slightly moist.
140				0	52	0			Numerous cobbles from 141' to 147'.
				0	60	0			
150				0	41	-			Numerous cobbles from 150.5' to 153'.
									Granitic boulder at 153'.
				0	64	0		SP	SAND - Fine to coarse sand with fine gravel and occasional pieces coarse gravel, orange-brown to dark orange-brown, slightly moist to moist, micaceous.
160				0	50	0			Thick lens of gravelly sand from 159' to 160.5'.
				0	-	0			Lens of gravelly sand, mottled pale gray-brown and light orange- brown from 162' to 163'.
170				-	48	-			
	G-3	⋈	100	0	56	-			Fine to medium sand with some coarse sand, occasional pieces fine gravel and trace silt, dark orange-brown, moist to very moist, micaceous.
									Thin lens of sandy silt with some fine gravel, wet at 175.5'.
									Fine sand from 177' to 178', saturated.
180									Total Depth =179'. Groundwater at 171.5'.
190									
200									

FOSTER WHEELER ENVIRONMENTAL CORPORATION

B-29

PROJECT *Jet Propulsion Laboratory*
LOCATION *Discharge Point No. 2*
GEOLOGIST *B.G. Randolph*
DRILLING CO *Boart Longyear*
DATE (start/finish) *4-11-97 / 4-12-97*

DRILLING METHOD *Sonic*
SAMPLING METHOD *Cont. 6" Core / Grab and 2.5" split-spn.*
SURFACE ELEVATION *1086.8 Feet*
TOTAL DEPTH (ft) *83*
DEPTH TO WATER (ft) *81.7*



Depth (ft)	Sample No.	Samples	% Recovery	OVA (ppm) Drill Pipe	OVA (ppm) Sample	OVA (ppm) Breath Zn	Lithology	USCS Symbol	Lithologic Description and Notes
0									REINFORCED CONCRETE apron (6 inches thick).
								GP	GRAVEL base for pavement.
	VPSS-148		100	–	–	–		SP	SAND (FILL) – Fine to coarse sand with some fine gravel, brown, slightly moist. Dark gray-brown to dark gray from 4' to 4.5'.
	VPSS-149	X	100	0	0	0		GP	GRAVELLY SAND – Fine to coarse gravelly fine to coarse sand with cobbles and trace silt, light orange-brown, slightly moist.
10	VPSS-150	X	100	0	4	0		SP	SAND – Fine to coarse sand with fine to coarse gravel of trace silt, brown to orange-brown, slightly moist, micaceous.
	VPSS-151	X	100	0	5	0		GP	SANDY GRAVEL – Fine to coarse sand and fine to coarse gravel with small cobbles, light orange-brown, to orange brown, slightly moist.
								SP	Small boulder at 12.5'.
20	VPSS-152	X	100	0	14	0			SAND – Fine to coarse sand with fine to coarse gravel, small cobbles and trace silt, orange-brown, slightly moist to moist, micaceous.
	VPSS-153	X	100	0	7	0			
								SM	SILTY SAND – Silty fine sand with some medium sand and trace coarse sand, dark orange-brown, moist, very micaceous.
30	VPSS-154	X	100	0	5	0		SP	SAND – Fine sand with some medium sand and silt, orange-brown, moist, micaceous.
				0	37	0			Fine to coarse sand with some fine to coarse gravel and occasional small cobbles, orange-brown, moist.
									Lens of fine sand with some medium sand from 36' to 37'.
40		X		0	15	0			Some gray-brown mottling from 37.5' to 40'.
									Fine to coarse sand with some fine gravel.
				0	19	0			Numerous small cobbles from 43' to 45'.
									Large cobble/small boulder at 45'.
	VPSS-156	X		–	–	–			Small granitic boulder at 47'.
50		X		0	54	0			Numerous cobbles and small boulders from 51' to 56'.
				0	19	0			
									Occasional small cobbles from 57.5' to 60'.
60	VPSS-157	X	100	0	24	0			Boulder at 61.5'.
								SP	GRAVELLY SAND – Fine to coarse gravelly fine to coarse sand with small cobbles; mottled pale orange-brown, light gray-brown, and orange-brown; slightly moist to moist, trace mica.
				0	17	0		GP	
									Numerous small cobbles from 65' to 72'.
70	VPSS-158	X	100	–	27	–			
				–	27	–			
				–	29	–		SP	SAND – Fine to coarse sand with some fine gravel and trace silt, orange-brown to dark orange-brown, moist, micaceous.
									Numerous small cobbles; granitic boulder from 74.5' to 77.5'.
80	VPSS-159		100	–	–	–			Lens of fine to medium sand with some silt at 78', dark orange-brown, very moist.
				0	66	0			Alternating thin lenses of fine sand, fine sand with silt, fine to medium sand with some coarse sand and trace fine gravel from 79.5' to 83'.
									Wet at 82'.
									Total Depth =83'.
90									Groundwater at 81.7'.
100									

FOSTER WHEELER ENVIRONMENTAL CORPORATION

B-30

PROJECT *Jet Propulsion Laboratory*
LOCATION *Waste Pit Area No. 4*
GEOLOGIST *B.G. Randolph*
DRILLING CO *Boart Longyear*
DATE (start/finish) *4-1-97 / 4-2-97*

DRILLING METHOD *Sonic*
SAMPLING METHOD *Cont. 6" Core / Grab and 2.5" splt-spn.*
SURFACE ELEVATION *1088.9 Feet*
TOTAL DEPTH (ft) *72*
DEPTH TO WATER (ft) *68.9*

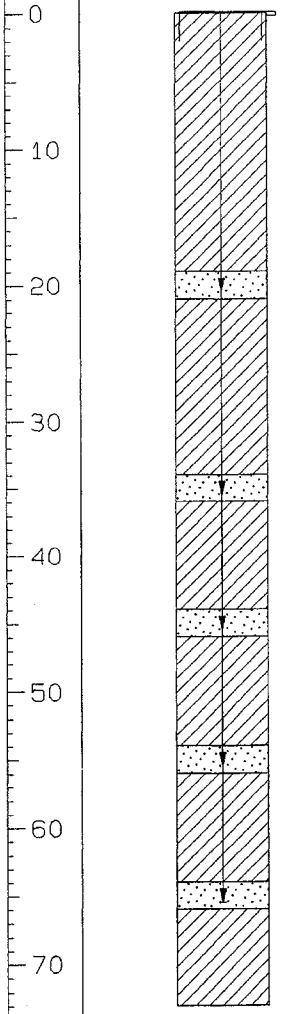
Depth (ft)	Soil-Vapor Well Completion	Sample No.	Samples	% Recovery	OVA (ppm) Drill Pipe	OVA (ppm) Sample	OVA (ppm) Breath Zn	Lithology	USCS Symbol	Lithologic Description and Notes
0									GP	ASPHALT pavement (3-inches thick)
									GP	Gravel base for pavement.
		VPSS-130	X	100	0	134	0		SP	SAND (FILL) - Fine to coarse sand with some fine gravel, dark gray and gray-brown, damp. Very dark gray to black at 2.5'. soil appears to be burned.
10		VPSS-131	X	100	0	21	0		SP	Trash in soil from 3' to approx. 4.5', pieces of wire, steel cable with clevis pin, pieces of concrete with wire mesh, pieces fo fine wire and ashes.
		VPSS-132		100	0	22	0		GP	Fine to coarse sand with some fine to coarse gravel and some cobbles; dark gray to dark gray-brown; slightly moist.
									SP	SAND - Fine to coarse sand with some fine to coarse gravel with some cobbles, orange-brown, slighlty moist, trace mica.
20		VPSS-133	X	100	0	43	0			SANDY GRAVEL - Fine to coarse sand and fine to coarse gravel with cobbles, light gray-brown to gray brown, slightly moist, large cobbles from 13.5' to 14.5'.
					0	4	0			SAND - Fine to caorse sand with fine to coarse gravel, cobbles and trace silt, gray-brown, moist.
30		VPSS-134	X	100	0	24	0			Boulder at 17.5'.
										Orange-brown at 22.5'.
					0	7	0			Fine to coarse sand, mottled orange-brown and gray-brown, moist.
										Fine to medium sand with some silt, very micaceous from 36.5' to 38'.
40		VPSS-135	X	100	0	16	0			Gravelly sand with cobbles from 38' to 39.5'.
					0	32	0		SP GP	GRAVELLY SAND AND SANDY GRAVEL - Alternating thin lenses fine gravelly fine to coarse sand with some coarse gravel and fine to coarse sandy fine to coarse gravel with small cobbles, light orange-brown to orange-brown, slightly moist to moist, some mica.
50		VPSS-136		100	0	24	0		SP	SAND - Fine to medium sand with some fine gravel and occasional pieces coarse gravel and cobbles, orange-brown, slightly moist, micaceous.
					0	0	0			Fine to coarse sand with fine to coarse gravel and cobbles and small boulders from 49.5' to 62'.
										Thin layer dessicated silty fine sand, partially cemented, damp at 59.5'.
60		VPSS-137	X	100	-	-	-			Lens fine sand with silt, dark orange-brown, moist from 62.5' to 63.5'.
					0	40	0			Fine to medium sand, light orange-brown to orange-brown from 63.5' to 65.5'.
									SP	SAND WITH SILT - Fine sand with silt and some medium sand and occasional pieces coarse sand, dark orange-brown, moist to very moist, micaceous.
70		VPSS-138		100	0	27	0		SM SP	SAND - Fine to medium sand wiht some silty and coarse sand; occasional pieces fine gravel, dark orange-brown, moist to very moist, micaceous.
										Saturated at 70.5'.
80										Total Depth =72'. Groundwater at 68.9'.
90										
100										

FOSTER WHEELER ENVIRONMENTAL CORPORATION

B-31

PROJECT *Jet Propulsion Laboratory*
LOCATION *Waste Pit Area No. 5*
GEOLOGIST *B.G. Randolph*
DRILLING CO *Boart Longyear*
DATE (start/finish) *4-8-97 / 4-9-97*

DRILLING METHOD *Sonic*
SAMPLING METHOD *Cont. 6-inch core / 2.5-inch splt-spn.*
SURFACE ELEVATION *1083.1 Feet*
TOTAL DEPTH (ft) *73*
DEPTH TO WATER (ft) *70.9*



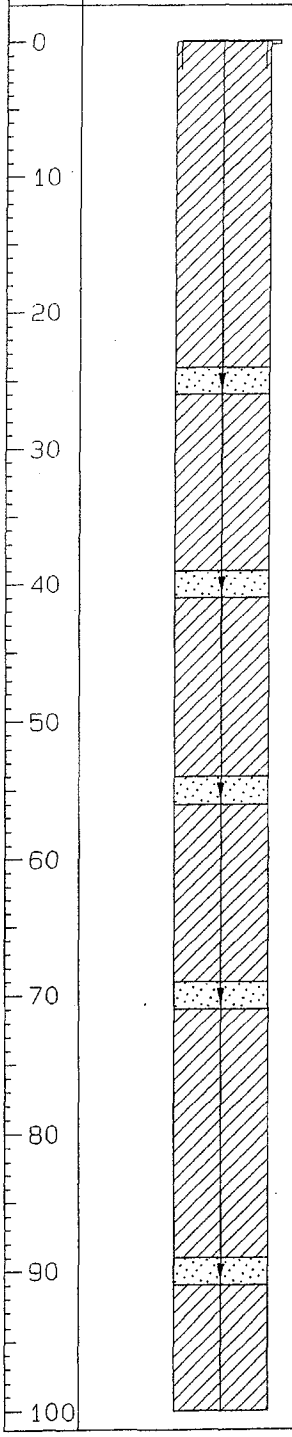
Depth (ft)	Sample No.	Samples	% Recovery	OVA (ppm) Drill Pipe	OVA (ppm) Sample	OVA (ppm) Breath Zn	Lithology	USCS Symbol	Lithologic Description and Notes
0								SP	ASPHALT pavement (3-inches thick)
									SAND (Fill) - Fine to coarse sand with fine to coarse gravel, mottled gray-brown and orange-brown, slightly moist.
	VPSS-139	⊠	100	32	16	0			
								SP	Fine to coarse sand with fine gravel and occasional pieces coarse gravel, trace silt, gray-brown to orange-brown, slightly moist.
10	VPSS-140	⊠	100	0	27	0			SAND - Fine to coarse sand with fine gravel and occasional pieces coarse gravel, trace silt, orange-brown, slightly moist.
	VPSS-141	⊠	100	1	28	0			Numerous cobbles 7' to 19'.
									Boulder at 17'.
20	VPSS-142	⊠	100	1	23	0			
								GP	GRAVELLY SAND - Fine to coarse gravel fine to coarse sand with trace silt, light oragne-brown, slightly moist.
				1	26	0		SP	SAND - Fine to coarse sand with some fine gravel and occasional pieces course gravel, and small cobbles, trace silt; dark orange-brown, moist, micaceous.
30	VPSS-143		100	1	36	0		SP	SAND WITH SILT - Fine sand with silt and occasional pieces medium and coarse sand, dark orange-brown, moist to very moist, very micaceous.
								SM	
				1	45	0		SP	SAND - Fine to coarse sand with fine to coarse gravel, some small cobbles and trace silt; mottled gray-brown and dark orange-brown, moist, micaceous.
40	VPSS-144	⊠	100	0	38	0			Thin lenses silty fine sand at 36' and 40'.
				0	52	0		SM	SILTY SAND - Silty fine sand with some medium sand, dark orange brown, moist, very micaceous.
								SP	SAND - Fine sand with trace medium sand and trace silt, dark orange-brown, moist, very micaceous.
50	VPSS-145	⊠	100	0	35	0			
				-	35	-			Alternating lenses fine sand with some silt and fine to coarse sand with fine gravel and occasional pieces coarse gravel, light orange-brown to orange-brown, slightly moist to moist from 52.5' to 61.5'.
60	VPSS-146	⊠	100	-	36	-			
				0	46	0			Fine sand with some medium sand and trace coarse sand and silt, occasional pieces fine to coarse gravel, moist, micaceous.
									Fine to coarse sand with occasional pieces fine to coarse gravel and trace silt, orange-brown, moist, micaceous.
70	VPSS-147		100	-	26	-			
									Thin lens fine sand with some medium sand and silt at 71.5', wet.
									Total Depth =73'. Groundwater at 70.9'.
80									
90									
100									

FOSTER WHEELER ENVIRONMENTAL CORPORATION

B-32

PROJECT *Jet Propulsion Laboratory*
LOCATION *SE cor. Transportation Parking Lot*
GEOLOGIST *B.G. Randolph*
DRILLING CO *Boart Longyear*
DATE (start/finish) *3-28-98/ 3-29-98*

DRILLING METHOD *Sonic*
SAMPLING METHOD *Continuous 6-inch Core & Grab*
SURFACE ELEVATION *1206.6 Feet*
TOTAL DEPTH (ft) *210*
DEPTH TO WATER (ft) *203.2*



Depth (ft)	Sample No.	Samples	% Recovery	OVA (ppm) Drill Pipe	OVA (ppm) Sample	OVA (ppm) Breath Zn	Lithology	USCS Symbol	Lithologic Description and Notes
0								GP	GRAVEL base for pavement
								SP	SAND (FILL) - Fine to coarse sand with occasional pieces fine gravel, dark brown with some gray-brown mottling, slighlty moist.
									Occasional pieces coarse gravel from 2.5' to 6'.
10				0	1	0			
				-	8	-			
20				0	6	0			
				-	13	-			*Fine to coarse sand with some silt and fine gravel, dark orange-brown.*
30				0	12	0		SM	SILTY SAND - Silty fine to coarse sand, mottled dark orange-brown and dark gray-brown, very moist, micaceous.
								SP SM	SAND WITH SILT - Fine to coarse sand with silt and occasional pieces fine gravel, dark orange-brown, moist, micaceous.
				0	8	0			Some fine gravel from 34' to 36'.
40				0	8	0		SM	SILTY SAND - Silty fine to medium sand with some coarse sand and occasional pieces fine gravel, dark orange-brown, moist, trace mica.
								SM ML	SILTY SAND - Silty fine to medium with trace coarse sand, mottled dark orange-brown and dark reddish brown, moist, micaceous.
				0	2	0		SP	Thin lens gravelly silty fine to medium sand at 43'.
50				-	3	-			SAND - *Fine to coarse sand with some silt and fine gravel, dark* orange-brown, moist.
									Occasional small cobbles from 46' to 48.5'.
				0	22	0			*Fine to coarse sand with some fine gravel and trace silt, mottled light* orange-brown and orange-brown, slightly moist, micaceoous.
60				0	2	0			Gravelly fine to coarse sand from 56.5' to 58.5'.
									Occasional pieces gravel from 61.5' to 65'.
				-	16	-			Fine to medium sand with some coarse sand, orange-brown.
	G-27	⊠							Occasional pieces fine gravel from 68' to 70'.
70				0	11	0		SP	GRAVELLY SAND AND SANDY GRAVEL - Alternating thin lenses of fine
				0	3	0		GP	*to coarse gravelly fine to coarse sand with trace silt* and fine to coarse sandy fine to coarse gravel with trace silt and occasional small cobbles; mottled light orange-brown, orange-brown, gray-brown; slightly moist, some mica.
									Large cobble at 77'.
80				0	10	0			Numerous decomposed granitic and schistosed gravels and small cobbles from 80' to 83'.
				-	5	-			*Granitic boulder at 83'.*
								SP	Lens silty fine sand with mud sand and some coarse sand at 85'.
90				0	20	0			SAND - Fine to medium sand with coarse sand and occasional pieces fine gravel, orange-brown, slightly moist to moist.
									Thin lens silty fine sand with some medium to coarse sand, dark gray-brown.
	G-28	⊠		-	1	-			Large cobbles from 92' to 93'.
								SP GP	GRAVELLY SAND AND SANDY GRAVEL - Fine to coarse gravelly fine to coarse sand and fine to coarse sandy fine to coarse gravel, dark orange-brown to gray-brown, slightly moist, trace mica.
100				0	2	0			

FOSTER WHEELER ENVIRONMENTAL CORPORATION

B-32

PROJECT *Jet Propulsion Laboratory*
LOCATION *SE cor. Transportation Parking Lot*
GEOLOGIST *B.G. Randolph*
DRILLING CO *Boart Longyear*
DATE (start/finish) *3-28-98/ 3-29-98*

DRILLING METHOD *Sonic*
SAMPLING METHOD *Continuous 6-inch Core & Grab*
SURFACE ELEVATION *1206.6 Feet*
TOTAL DEPTH (ft) *210*
DEPTH TO WATER (ft) *203.2*

Depth (ft)	Soil-Vapor Well Completion	Sample No.	Samples	% Recovery	OVA (ppm) Drill Pipe	OVA (ppm) Sample	OVA (ppm) Breath Zn	Lithology	USCS Symbol	Lithologic Description and Notes
100									SP	Large cobbles from 100.5 to 102
									GP	SAND - Fine to medium sand with coarse sand and some fine gravel, light orange-brown to brown, slightly moist.
					0	5	0		SP	
										Small cobbles from 107' to 108'.
110					-	4	-		SP GP	GRAVELLY SAND AND SANDY GRAVEL - Fine to coarse gravelly fine to coarse sand and fine to coarse sandy fine to coarse gravel, light gray-brown to light brown, slightly moist, trace mica.
					0	2	0		SP	Occasional large cobbles from 110' to 113'.
										SAND - Fine to medium sand with coarse sand some fine gravel, dark brown to gray-brown, moist, some mica.
120					0	6	0		SP GP	GRAVELLY SAND AND SANDY GRAVEL - Fine to coarse gravelly fine to coarse sand and fine to coarse sandy fine to coarse gravel; light gray, green-gray, to brown; damp.
									SP	
					0	16	0			Large cobbles from 121' to 122'.
										SAND - Fine to coarse sand with some silt, fine gravel and occasional pieces coarse gravel; orange-brown, slightly moist, micaceous.
130					-	3	-			Thin lens silty fine sand at 122.5'.
										Moist from 127' to 132'.
					0	23	0			Occasional pieces decomposed granite, schist, gneiss from 132' to 134'.
									SP SM	SAND WITH SILT - Fine to coarse sand with silt and some fine gravel, dark orange-brown to green-brown, moist, micaceous.
140					0	30	0			Large cobbles of decomposed granite and schist at 139'.
										Large pieces of highly decomposed granite and schist from 142' to 145'.
					0	3	0			
150					0	10	0		SM	SILTY SAND - Silty fine to medium sand with some coarse sand and some coarse gravel, dark green-brown to orange-brown, moist, micaceous.
									SP	
					-	9	-		SM SP	SAND WITH SILT - Fine to coarse sand with silt and some fine gravel, dark orange-brown, moist, micaceous.
									SM	SAND - Fine to coarse sand with some fine gravel, dark brown to orange-brown, moist, micaceous.
160					0	0	0		SP GP	SILTY SAND - Silty fine to medium sand with trace coarse sand and fine gravel, dark orange-brown, moist, micaceous.
					0	1	0			SAND, GRAVELLY SAND AND SANDY GRAVEL - Interbedded thin layers of fine to coarse sand with trace silt, fine to coarse sand with fine to coarse gravel, and fine to coarse sandy fine to coarse gravel with occasional small cobbles; mottled pale yellow-brown, orange-brown, light gray-brown; slightly moist to moist, micaceous.
170					0	0	0		GP	SANDY GRAVEL - Fine to coarse sandy fine to coarse gravel; mottled pale orange-brown, orange-brown, and light gray-brown; slightly moist.
					0	1	0			Occasional thin lenses of fine to coarse sand from 174' to 178'.
180					0	48	0			
										Lens fine to coarse sand with trace fine gravel at 182.5'.
		G-29			0	37	0		SP GP	GRAVELLY SAND AND SANDY GRAVEL - Alternating thin lenses of fine to coarse gravelly fine to coarse sand with trace silt and fine to coarse gravel with cobbles; mottled pale yellow-brown, light to dark orange-brown, and light gray-brown; slightly moist to moist, trace mica.
190					0	2	0			Large cobble at 186.5'
									SP	SAND - Fine to coarse sand with some fine gravel, yellow-brown to orange-brown, moist, trace mica; occasional pieces coarse gravel and cobbles from 193' to 198'.
					0	1	0			
200					0	7	0			

FOSTER WHEELER ENVIRONMENTAL CORPORATION

B-32

PROJECT *Jet Propulsion Laboratory*
LOCATION *SE cor. Transportation Parking Lot*
GEOLOGIST *B.G. Randolph*
DRILLING CO *Boart Longyear*
DATE (start/finish) *3-28-98/ 3-29-98*

DRILLING METHOD *Sonic*
SAMPLING METHOD *Continuous 6-inch Core & Grab*
SURFACE ELEVATION *1206.6 Feet*
TOTAL DEPTH (ft) *210*
DEPTH TO WATER (ft) *203.2*

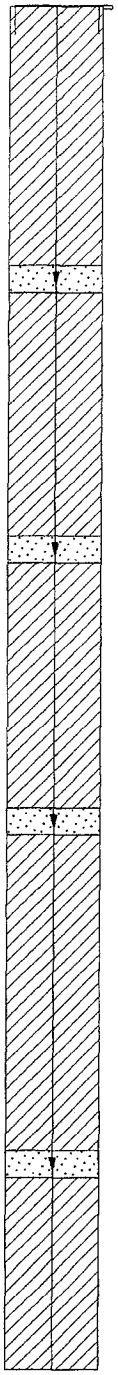
Depth (ft)	Soil-Vapor Well Completion	Sample No.	Samples	% Recovery	OVA (ppm) Drill Pipe	OVA (ppm) Sample	OVA (ppm) Breath Zn	Lithology	USCS Symbol	Lithologic Description and Notes
200									SP	Fine to medium sand with some silt and trace coarse sand from 202.5' to 204'.
					0	4	0			Very moist at 203'.
										Very moist to wet at 205'.
210					0	32	0			Thin lens fine sandy silt, green-gray, and small cobble at 206.5'.
										Core saturated at 208'.
										Total Depth = 210'. Water level at 203.2'.
220										
230										
240										
250										
260										
270										
280										
290										
300										

FOSTER WHEELER ENVIRONMENTAL CORPORATION

B-33

PROJECT *Jet Propulsion Laboratory*
LOCATION *West side of trailers N. of Bldg. 79*
GEOLOGIST *B.G. Randolph*
DRILLING CO *Boart Longyear*
DATE (start/finish) *3-30-98 / 3-31-98*

DRILLING METHOD *Sonic*
SAMPLING METHOD *Continuous 6-inch Core & Grab*
SURFACE ELEVATION *1214.0 Feet*
TOTAL DEPTH (ft) *213*
DEPTH TO WATER (ft) *210.2*



Depth (ft)	Sample No.	Samples	% Recovery	OVA (ppm) Drill Pipe	OVA (ppm) Sample	OVA (ppm) Breath Zn	Lithology	USCS Symbol	Lithologic Description and Notes
0									ASPHALT pavement (2.5 inches thick).
								GP	GRAVEL base for pavement
				0	25	0		SP	SAND - Fine to coarse sand with occasional pieces coarse gravel, orange-brown, moist.
10				0	18	0			Very moist at 8'.
									Thin lens fine to medium sand with silty, dark orange-brown, micaceous at 10'.
				-	42	-			Fine to coarse sand with some silt and very moist from 13.5' to 15'.
								SP	SAND WITH SILT - Fine to coarse sand with silt and fine gravel, dark orange-brown, very moist.
20				0	32	0		SM	SILTY SAND - Silty fine to coarse sand with some fine gravel, dark orange-brown, very moist to wet, micaceous.
								SP	SAND AND SILTY SAND - *Alternating thin lenses fine to coarse sand* with trace silt and some fine gravel, silty fine to coarse sand with trace fine gravel; orange-brown and dark orange-brown, mottled orange-brown and dark orange-brown with gray-brown splotches, moist to very moist.
				0	34	0		SM	
								SM	
30				0	29	0		GM	
								SP	SILTY SAND - Silty fine to medium sand with some coarse sand and trace fine gravel, dark orange-brown, moist.
								SM	
				0	84	0			SILTY GRAVEL - Silty fine gravel with fine to coarse sand, mottled dark *orange-brown and yellow-brown, slightly moist to, moist.*
40				0	80	0			SAND AND SILTY SAND - Alternating layers fine to coarse sand with fine gravel and some silty, and silty fine to coarse sand with trace fine gravel; mottled light yellow-brown, dark orange-brown, and gray-brown; slightly moist to moist, micaceous.
								SP	
				0	29	0			Fine to coarse gravel from 39' to 40.5'.
									SAND WITH SILT - Fine to medium sand with silt and some coarse sand *and fine gravel, dark orange-brown, moist.*
50				-	30	-			Occasional pieces coarse gravel from 41' to 47'.
									Mottled dark orange-brown and gray-brown from 45' to 51'.
								SP	
				0	27	0			Cobbles at 48' and 49'.
									SAND - Fine to coarse sand with some silt and fine gravel, mottled gray-brown and orange-brown, moist.
60				0	26	0			Occasional very thin lenses silty fine sand from 53.5' to 55.5'.
									Some coarse gravel at 56'.
								SP	
				0	17	0		GP	Frequent cobbles from 60' to 94'.
									GRAVELLY SAND AND SANDY GRAVEL - Fine to coarse gravelly fine to coarse sand and fine to coarse sandy fine to coarse gravel, dark orange- brown, damp, micaceous.
70				0	5	0			Dioritic/gabberoic boulder from 68.5' to 71'.
				-	5	-			
80				0	11	0		SP	SAND - Fine to coarse sand with some fine gravel, dark orange-brown, slightly moist, micaceous.
				0	40	0			Occasional pieces fine to coarse gravel from 85.5' to 89'.
									Mottled dark gray to green-brown.
90	G-30	⊠		-	25	-			
				0	15	0			
100				0	12	0			

FOSTER WHEELER ENVIRONMENTAL CORPORATION

B-33

PROJECT *Jet Propulsion Laboratory*
LOCATION *West side of trailers N. of Bldg. 79*
GEOLOGIST *B.G. Randolph*
DRILLING CO *Boart Longyear*
DATE (start/finish) *3-30-98 / 3-31-98*

DRILLING METHOD *Sonic*
SAMPLING METHOD *Continuous 6-inch Core & Grab*
SURFACE ELEVATION *1214.0 Feet*
TOTAL DEPTH (ft) *213*
DEPTH TO WATER (ft) *210.2*

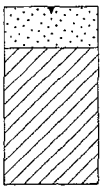
Depth (ft)	Soil-Vapor Well Completion	Sample No.	Samples	% Recovery	OVA (ppm) Drill Pipe	OVA (ppm) Sample	OVA (ppm) Breath Zn	Lithology	USCS Symbol	Lithologic Description and Notes
100									SP	Highly decomposed cobbles of diorite/gabbro and schist from 101' to 102'.
					0	11	0			Occasional pieces fine to coarse gravel from 103' to 104.5'.
										Thin lens silty fine sand with some fine gravel at 104.5'.
110					0	14	0			Numerous cobbles from 106' to 110'.
										Moist at 111'.
					0	15	0		SM	SILTY SAND - Silty fine sand with some medium to coarse sand and trace fine gravel, dark green-brown to orange-brown, moist, micaceous.
120					0	45	0		SP	Thin lens silt with fine sand at 116'.
										SAND WITH SILT - Fine to medium sand with silt and some coarse sand and fine gravel, dark orange-brown, slightly moist, micaceous.
					0	37	0			Thin lens silty fine sand at 123'.
										Fine to coarse sand with some silt and fine to coarse gravel, orange-brown, slightly moist to moist, some mica.
130					0	21	0			Small cobble at 126'.
										Fine to coarse sand with silt and some fine gravel from 129' to 131.5'.
					-	23	-			Occasional small cobbles from 136' to 138.5'.
140					0	14	0			Occasional small cobbles from 141.5' to 145'.
		G-31								
					0	14	0			Fine to coarse sand with some fine gravel, trace silty, and occasional pieces coarse gravel from 145' to 161.5'.
150					-	13	-			Small cobble at 148.5'.
										Small cobble at 151.5'.
					0	18	0			
										Large cobble at 156'.
160					0	60	0			Thin lens fine to coarse sand with silt, dark orange-brown at 157.5'.
										Mottled light orange-brown and orange-brown from 160' to 163.5'.
					0	13	0			Fine to coarse sand with some fine to coarse gravel and trace silt.
										Large cobble at 165'.
170					0	23	0			Small cobble at 169.5'.
									SP/GP	GRAVELLY SAND AND SANDY GRAVEL - Alternating thin lenses fine to coarse gravelly fine to coarse sand and fine to coarse sandy fine to coarse gravel with occasional small cobbles, light orange-brown to orange-brown, slightly moist to moist, some mica.
					0	7	0			
										Thin lens silty fine to coarse sand, dark orange-brown at 177'.
180					0	19	0			Large cobbles at 179'.
									SP	SAND - Fine to coarse sand with some silt and some fine gravel, dark orange-brown, slightly moist, micaceous.
					0	11	0			Small cobbles at 182.5'.
										Large cobbles at 185.5'
190					0	1	0			Large cobbles at 190'.
					0	10	0			
200					0	11	0			

FOSTER WHEELER ENVIRONMENTAL CORPORATION

B-33

PROJECT *Jet Propulsion Laboratory*
LOCATION *West side of trailers N. of Bldg. 79*
GEOLOGIST *B.G. Randolph*
DRILLING CO *Boart Longyear*
DATE (start/finish) *3-30-98 / 3-31-98*

DRILLING METHOD *Sonic*
SAMPLING METHOD *Continuous 6-inch Core & Grab*
SURFACE ELEVATION *1214.0 Feet*
TOTAL DEPTH (ft) *213*
DEPTH TO WATER (ft) *210.2*

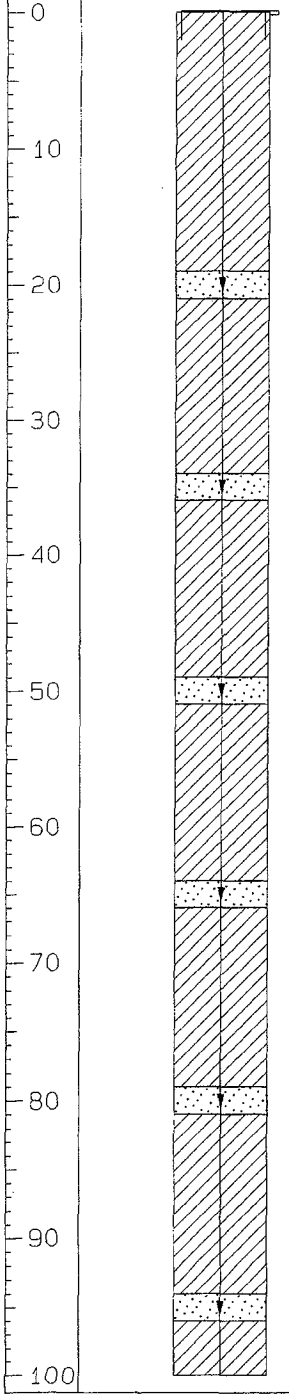
Depth (ft)	Soil-Vapor Well Completion	Sample No.	Samples	% Recovery	OVA (ppm) Drill Pipe	OVA (ppm) Sample	OVA (ppm) Breath Zn	Lithology	USCS Symbol	Lithologic Description and Notes
200									SP	Occasional pieces fine to coarse gravel from 201' to 203'.
					0	5	0			*Large cobbles at 205'.*
										Occasional pieces fine to coarse gravel from 206' to 208'.
210					-	6	-			Core saturated below 210'.
										Thin lens silty fine sand at 211.5'.
										Total Depth = 213. Water level at 210.2'.
220										
230										
240										
250										
260										
270										
280										
290										
300										

FOSTER WHEELER ENVIRONMENTAL CORPORATION

B-34

PROJECT *Jet Propulsion Laboratory*
LOCATION *Parking area in front of Bldg. 122*
GEOLOGIST *B.G. Randolph*
DRILLING CO *Boart Longyear*
DATE (start/finish) *4-7-98 / 4-8-98*

DRILLING METHOD *Sonic*
SAMPLING METHOD *Continuous 6-inch Core & Grab*
SURFACE ELEVATION *1164.3 Feet*
TOTAL DEPTH (ft) *135*
DEPTH TO WATER (ft) *129*



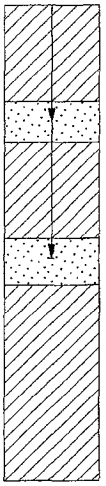
Depth (ft)	Sample No.	Samples	% Recovery	OVA (ppm) Drill Pipe	OVA (ppm) Sample	OVA (ppm) Breath Zn	Lithology	USCS Symbol	Lithologic Description and Notes
0								GP	ASPHALT pavement (2.5 inches thick).
								GP	GRAVEL base for pavement
				0	1	0		SP	SAND - *Fine to coarse sand with some fine gravel and trace silt, dark* brown, slightly moist, micaceous.
10				0	14	0			
				0	10	0		SP	GRAVELLY SAND AND SANDY GRAVEL - Fine to coarse gravelly fine to coarse sand and fine to coarse sandy fine to coarse gravel, orange-brown, moist, micaceous.
								GP	
								SP	SAND WITH SILT - Fine to coarse sand with silt and some fine gravel,
20				0	7	0		SM	dark orange-brown, moist.
								SP	SAND - Fine to coarse sand with fine gravel and some silt and occasional cobbles, light orange-brown, slightly moist, micaceous.
				-	10	-			
								SM	SILTY SAND - Silty fine to coarse sand with some fine gravel, dark orange-brown to green-brown, very moist, micaceous.
30				0	7	0			
				0	40	0		SP	SAND - Fine to coarse sand with some fine gravel, dark orange-brown to light gray-brown, slightly moist, with trace mica.
									Occasional small and large cobbles 35.5' to 40'.
40				0	6	0			Large cobble at 39'.
				-	19	-			Granitic boulder at 44'.
								SP	GRAVELLY SAND AND SANDY GRAVEL - Fine to coarse gravelly fine to
								GP	coarse sand and fine to coarse sandy fine to coarse gravel, dark brown to orange-brown, slightly moist, trace mica.
50	G-34	⊠		0	17	0			Large cobble at 48'.
									Large cobble at 52'.
				0	20	0			Lens silty fine to medium sand at 55'.
									Thin lens silty fine sand at 57'.
60				0	3	0		SP	SAND - fine to coarse sand with fine gravel and trace silt, mottled orange-brown and light gray-brown, slightly moist to moist.
				0	81	0			Occasional pieces coarse gravel from 60' to 65'.
									Slightly moist at 66.5'.
70				0	5	0			Small cobble at 68'.
									Small cobbles from 72' to 74'.
				0	6	0			Thin lens silty fine to medium sand at 74.5'.
									Coarse gravel from 76' to 79'.
80				0	9	0			Fine to medium sand with some coarse sand from 79' to 81'.
									Fine to coarse sand with some fine gravel from 81.5' to 86'.
				0	23	0			Fine to coarse sand with fine gravel and some coarse gravel, slightly moist.
90				0	10	0			Gravelly from 89' to 91.5'.
									Fine to medium sand with coarse sand and trace fine gravel.
				0	35	0			Fine to coarse sand with fine gravel and trace silt, dark orange-brown, moist.
100				0	16	0		SM	Fine to coarse sand with some fine gravel, orange-brown, slightly moist.

FOSTER WHEELER ENVIRONMENTAL CORPORATION

B-34

PROJECT *Jet Propulsion Laboratory*
LOCATION *Parking area in front of Bldg. 122*
GEOLOGIST *B.G. Randolph*
DRILLING CO *Boart Longyear*
DATE (start/finish) *4-7-98 / 4-8-98*

DRILLING METHOD *Sonic*
SAMPLING METHOD *Continuous 6-inch Core & Grab*
SURFACE ELEVATION *1164.3 Feet*
TOTAL DEPTH (ft) *135*
DEPTH TO WATER (ft) *129*

Depth (ft)	Soil-Vapor Well Completion	Sample No.	Samples	% Recovery	OVA (ppm) Drill Pipe	OVA (ppm) Sample	OVA (ppm) Breath Zn	Lithology	USCS Symbol	Lithologic Description and Notes
100										
					0	20	0		SM	SILTY SAND – Silty fine sand with some medium sand and trace coarse sand and fine gravel, dark orange-brown, slightly moist to moist, micaceous.
										Thin lens fine to coarse sand with fine gravel and trace silt at 103'.
									SP	SAND – Fine to medium sand with some coarse sand and trace fine gravel, orange-brown, slightly moist.
110		G-35			0	99	0		SP	
									SM	SAND AND SILTY SAND – Alternating thin lenses of fine to medium sand with silt and some coarse sand and silty fine to medium sand with trace coarse sand, dark orange-brown, slightly moist to moist, micaceous.
					0	12	0			Occasional piecse fine gravel from 108' to 112'.
120					0	19	0		SP	SAND – Fine to coarse sand with trace silt and occasional pieces fine gravel, orange-brown to dark orange-brown, slightly moist, micaceous.
									SM	SILTY SAND – Silty fine to medium sand with some coarse sand, dark orange-brown, moist, micaceous.
					0	15	0		SP GP	GRAVELLY SAND AND SANDY GRAVEL – Alternating thin layers fine to coarse gravelly fine to coarse sand and fine to coarse sandy fine to coarse gravel, light orange-brown to orange-brown, slightly moist to moist, micaceous.
130					–	15	–		GP	SANDY GRAVEL – Fine to coarse sandy fine to coarse gravel with some occasional cobbles, slightly moist to moist; mottled light orange-brown, light gray-brown, and orange-brown, small and large cobbles from 131.5' to 135'.
										Free water in core barrel; bottom of borehole filling with water.
140										Encounter perched groundwater at approximately 129'. Water level stabilized at 127.3' below ground surface.
										Total Depth = 135. Water level at 127.3'.
150										
160										
170										
180										
190										
200										

FOSTER WHEELER ENVIRONMENTAL CORPORATION

B-35

PROJECT *Jet Propulsion Laboratory*
LOCATION *Parking lot , Bldg. 296 SW cor.*
GEOLOGIST *B.G. Randolph*
DRILLING CO *Boart Longyear*
DATE (start/finish) *4-13-98 / 4-14-98*

DRILLING METHOD *Sonic*
SAMPLING METHOD *Continuous 6-inch Core & Grab*
SURFACE ELEVATION *1183.2 Feet*
TOTAL DEPTH (ft) *162.5*
DEPTH TO WATER (ft) *161.8*

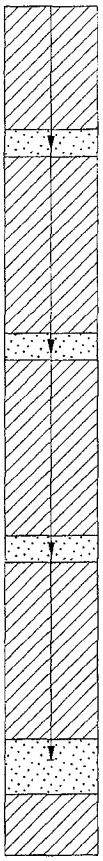
Depth (ft)	Soil-Vapor Well Completion	Sample No.	Samples	% Recovery	OVA (ppm) Drill Pipe	OVA (ppm) Sample	OVA (ppm) Breath Zn	Lithology	USCS Symbol	Lithologic Description and Notes
0									GP	ASPHALT pavement (2.5 inches thick).
									SP	GRAVEL base for pavement
					0	5	0		SP	SAND (FILL) - Fine to coarse sand with some fine gravel and trace coarse gravel, gray-brown to dark gray-brown, slighlty moist to moist.
10					0	6	0			SAND - Fine to coarse sand with some fine gravel and trace silt, orange-brown, slightly moist to moist.
										Occasional pieces coarse gravel from 6' to 19'.
					-	9	-			Fine to coarse sand with some silt from 9.5' to 12'.
										Thin lens fine to coarse sand with some silt at 16.5'.
20					0	17	0		SM	SILTY SAND - Silty fine to medium sand with some coarse sand and occasional pieces fine gravel, orange-brown, moist.
					-	26	-		SP	SAND - Fine to coarse sand with some silt and occasional pieces fine gravel, dark orange-brown, moist.
30					0	17	0		SM	SILTY SAND - Silty fine to coarse sand with some fine gravel and occasional pieces coarse gravel, dark orange-brown, very moist.
									SP	SAND - Fine to coarse sand with some fine gravel and trace silt, orange-brown, moist.
					0	55	0		SP	SAND AND SILTY SAND - Alternating thin layers fine to coarse sand with some silt and silty fine to medium sand with some coarse sand and occasional pieces fine gravel, orange-brown to dark orange- brown, moist.
40					0	22	0		SM	
									SP	
									SM	SAND - Fine to coarse sand with some fine gravel and trace silt, orange-brown, slighlty moist.
					0	13	0		SP	SILTY SAND - Silty fine to medium sand with some coarse sand and trace fine gravel, dark orange-brown, moist.
50					0	20	0			SAND - Fine to coarse sand with some fine gravel and trace silt, orange-brown to dark orange-brown, slightly moist to moist, micaceous.
									SP	SAND AND SILTY SAND - Alternating thin lenses fine to coarse sand with some silt, fine gravel and silty fine to medium sand with some coarse sand, dark orange-brown, moist, micaceous.
					0	17	0		SM	
									SP	
60					0	36	0			SAND - Fine to coarse sand with fine gravel and occasional piecse coarse gravel, orange-brown, slightly moist to moist.
										Granitic cobbles from 61.5' to 62.5'.
					0	13	0			Granitic boulder from 65' to 66.5'.
										Large cobbles from 66.5' to 68'.
70					0	13	0		SM	SILTY SAND - Silty fine to medium sand with some coarse sand and fine gravel, orange-brown, moist.
									SP	
					0	16	-			SAND - Fine to coarse sand with some fine gravel and trace silt, orange-brown to light brown, slighlty moist, micaceous.
										Occasional thin lenses of silty fine sand from 77' to 83'.
80					0	47	0			
		G-36			0	24	0		SP	SAND AND SILTY SAND - Alternating thin lenses fine to coarse sand with some silt and fine gravel and silty fine to coarse sand with some fine gravel, dark brown to dark orange-brown, moist, micaceous.
90					0	23	0		SM	
					-	33	-		SP	SAND - Fine to coarse sand with some fine gravel and trace silt, orange-brown, slighlty moist, micaceous.
										Small cobbles from 94' to 95'.
100					0	43	0			

FOSTER WHEELER ENVIRONMENTAL CORPORATION

B-35

PROJECT *Jet Propulsion Laboratory*
LOCATION *Parking lot , Bldg. 296 SW cor.*
GEOLOGIST *B.G. Randolph*
DRILLING CO *Boart Longyear*
DATE (start/finish) *4-13-98 / 4-14-98*

DRILLING METHOD *Sonic*
SAMPLING METHOD *Continuous 6-inch Core & Grab*
SURFACE ELEVATION *1183.2 Feet*
TOTAL DEPTH (ft) *162.5*
DEPTH TO WATER (ft) *161.8*



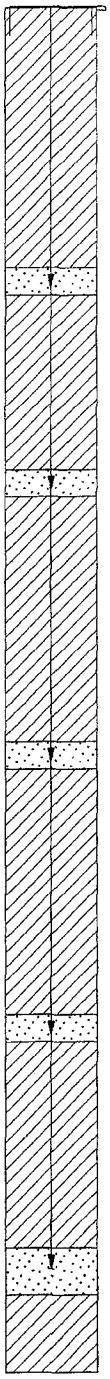
Depth (ft)	Sample No.	Samples	% Recovery	OVA (ppm) Drill Pipe	OVA (ppm) Sample	OVA (ppm) Breath Zn	Lithology	USCS Symbol	Lithologic Description and Notes
100								SP	Lens silty fine sand at 101'.
				0	25	0			Large granitic cobble at 103'.
									Occasional pieces coarse gravel from 107' to 109'.
110				0	28	0			Lens silty fine sand at 111.5'.
				0	104	0			Dark gray-brown, moist at 115'.
									Large cobble at 116'.
120				0	4	0			
				0	57	0			Light gray-brown, slightly moist at 124.5'.
									Occasional pieces fine to coarse gravel from 125' to 126'.
130				0	29	0			Small cobbles from 128' to 131'.
									Moist from 133' to 136'.
				-	22	-		SP SM	SAND AND SILTY SAND - Alternating thin lenses fine to coarse sand with some silt and fine gravel and silty fine to coarse sand with some fine gravel, dark orange-brown, moist, micaceous.
140				0	70	0			Thin lens silty fine sand at 140'.
									Very moist from 145' to 146'.
				-	20	-		SM	SILTY SAND - Silty fine to medium sand with some coarse sand and trace fine gravel, dark orange-brown, moist.
150				0	26	0		SP	SAND - Fine to coarse sand with some fine gravel and occasional pieces of coarse gravel, light orange-brown, damp, micaceous.
	G-37			0	57	0		SP GP	GRAVELLY SAND AND SANDY GRAVEL - Alternating thin lenses fine gravelly fine to coarse sand with trace silt and fine to coarse sandy fine to coarse gravel, mottled light yellow-brown and orange- brown, slightly moist.
160				0	28	0			Numerous cobbles from 155' to 159.5'.
									Very moist at 161.5'; wet at 162'.
									Total Depth = 162.5'. Water level at 161.8'.
170									
180									
190									
200									

FOSTER WHEELER ENVIRONMENTAL CORPORATION

B-36

PROJECT: Jet Propulsion Laboratory
LOCATION: Corporal Road Parking Lot, N. Side
GEOLOGIST: B.G. Randolph
DRILLING CO: Boart Longyear
DATE (start/finish): 3-26-98 / 3-27-98

DRILLING METHOD: Sonic
SAMPLING METHOD: Continuous 6-inch Core & Grab
SURFACE ELEVATION: 1232.8 Feet
TOTAL DEPTH (ft): 117
DEPTH TO WATER (ft): 98

Depth (ft)	Soil-Vapor Well Completion	Sample No.	Samples	% Recovery	OVA (ppm) Drill Pipe	OVA (ppm) Sample	OVA (ppm) Breath Zn	Lithology	USCS Symbol	Lithologic Description and Notes
0									SP	ASPHALT pavement (3 inches thick).
					-	5	-			GRAVELLY SAND - Fine gravelly fine to coarse sand, light brown, slightly moist, micaceous.
										Large cobbles from 7' to 8'.
10					0	4	0			Occasional pieces coarse gravel from 8.5' to 12'.
										Small cobble at 12.5'.
					-	13	-			Occasional large cobbles from 13.5' to 16'.
									SP	GRAVELLY SAND AND SANDY GRAVEL - Fine to coarse gravelly sand, and fine to coarse sandy fine to coarse gravel with occasional cobbles, orange-brown, slightly moist, micaceous.
20					0	19	0		GP	
					-	16	-		SM	SILTY SAND - Silty fine to coarse sand with some fine gravel, dark orange-brown, very moist, micaceous.
					0	-	0			Large cobble at 25.5'.
30					-	29	-		SP	GRAVELLY SAND - Fine to coarse gravelly fine to coarse sand, dark gray, damp, micaceous.
					0	8	0			Dark orange-brown at 32'.
										Large cobbles from 34.5' to 39'.
40					0	10	0			Dark gray at 39'.
									GP	SANDY GRAVEL - Fine to coarse sandy fine to coarse gravel, mottled green-gray, light orange-brown, slightly moist.
					0	5	0			Lens fine to coarse sand at 146.5'.
50					-	7	-			Large cobbles from 49' to 51.5'.
					0	20	0			Cobbles from 56' to 57'.
									SP	GRAVELLY SAND AND SANDY GRAVEL - Fine to coarse gravelly sand, and fine to coarse sandy fine to coarse gravel, dark orange-brown to green-brown, damp, micaceous.
60					0	6	0		GP	
										Occasional large cobbles from 58' to 62'.
					-	8	-			Fine to coarse sand at 65.5'.
										Large cobbles from 68.5' to 69.5'.
70					-	5	-		SP	GRAVELLY SAND - Fine to coarse gravelly fine to coarse sand, orange brown, slightly moist, micaceous.
		G-26			0	11	0			Frequent large cobbles from 74' to 79'.
										Large cobbles from 75.5' to 79'.
80					0	11	0			
					0	8	0			Mottled light gray, dark gray, brown and dark brown from 83.5' to 86'.
										Large cobble at 86'.
90					0	18	0			Large cobbles from 90.5' to 94'.
										Fine to coarse sand with fine gravel and trace silt at 95'.
					0	20	0			
									SP	GRAVELLY SAND AND SANDY GRAVEL - Fine to coarse gravelly sand and fine to coarse sandy fine to coarse gravel with cobbles, dark orange-brown and green-brown, slightly moist, micaceous.
100					0	28	0		GP	
									SP	

FOSTER WHEELER ENVIRONMENTAL CORPORATION

B-36

PROJECT *Jet Propulsion Laboratory*
LOCATION *Corporal Road Parking Lot, N. Side*
GEOLOGIST *B.G. Randolph*
DRILLING CO *Boart Longyear*
DATE (start/finish) *3-26-98 / 3-27-98*

DRILLING METHOD *Sonic*
SAMPLING METHOD *Continuous 6-inch Core & Grab*
SURFACE ELEVATION *1232.8 Feet*
TOTAL DEPTH (ft) *117*
DEPTH TO WATER (ft) *98*

Depth (ft)	Soil-Vapor Well Completion	Sample No.	Samples	% Recovery	OVA (ppm) Drill Pipe	OVA (ppm) Sample	OVA (ppm) Breath Zn	Lithology	USCS Symbol	Lithologic Description and Notes
100									SP	SAND - Fine to coarse sand with some fine gravel, dark orange- brown, slighity moist, micaceous.
					0	15	0		SP SM	SAND WITH SILT - Fine to medium sand with silt and some coarse sand, occasional pieces fine gravel, orange-brown to dark orange- brown, moist, very micaceous.
110					-	9	-		SM	SILTY SAND - Silty fine sand with some medium sand, dark orange-brown, moist, very micaceous.
					0	109	0		SP	Very moist at 113', and saturated from 113.5' to 114.5'.
										SAND - Fine to coarse sand with trace silt, dark orange-brown, very moist to wet, micaceous.
120										Water in bottom of borehole, total depth = 117'.
										Encountered confined perched water at approximatly 113.5'. Water level stabilized at 98.0' below ground surface.
130										Total Depth = 117'. Water level at 98.0'.
140										
150										
160										
170										
180										
190										
200										

FOSTER WHEELER ENVIRONMENTAL CORPORATION

B-37

PROJECT *Jet Propulsion Laboratory*
LOCATION *Explorer Road nr E end of Bldg 67*
GEOLOGIST *B.G. Randolph*
DRILLING CO *Boart Longyear*
DATE (start/finish) *4-6-98 / 4-7-98*

DRILLING METHOD *Sonic*
SAMPLING METHOD *Continuous 6-inch Core & Grab*
SURFACE ELEVATION *1195.7 Feet*
TOTAL DEPTH (ft) *193*
DEPTH TO WATER (ft) *189.5*

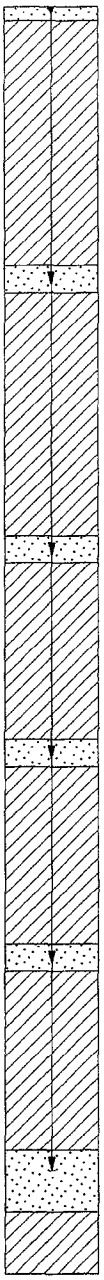
Depth (ft)	Soil-Vapor Well Completion	Sample No.	Samples	% Recovery	OVA (ppm) Drill Pipe	OVA (ppm) Sample	OVA (ppm) Breath Zn	Lithology	USCS Symbol	Lithologic Description and Notes
0									GP	ASPHALT pavement (3 inches thick).
									SP	Gravel base for pavement.
					-	19	-			SAND - *Fine to coarse sand with some fine gravel and trace silt*, orange-brown to dark orange-brown, slightly moist to moist.
10					0	12	0			Occasional pieces coarse gravel from 3' to 25.5'.
										Fine to coarse sand with some silt and fine gravel from 4.5' to 7'.
					0	51	0			Thin lens fine to medium sand with some silt at 9'.
										Thin lens fine to medium sand with some silt at 17.5'.
20					0	15	0			Gravelly fine to coarse sand from 20' to 23'.
										Small cobble at 21.5'.
					1	55	0			Fine to coarse sand sith some silt and fine gravel at 25.5'.
									SM	SILTY SAND - Silty fine to medium sand with some coarse sand and occasional pieces fine gravel, dark orange-brown, moist, micaceous.
30					0	21	0			
					0	39	0		SP	SAND - Fine to coarse sand with some fine gravel, light orange-brown, slightly moist.
									GP	SANDY GRAVEL - Fine to coarse sandy fine to coarse gravel with small to large cobbles, mottled light orange-brown and light gray-brown, slightly moist.
40					0	60	0			Numerous small and large cobbles from 38.5' to 42.5'.
					-	24	-		SP	SAND - Fine to coarse sand with some fine gravel, light orange- brown, slightly moist, some mica.
50					0	29	0			Occasional small balls silty fine sand (1.5" dia.) from 47.5' to 51.5'. Mottled light orange-brown, orange-brown, and dark orange-brown from 47.5' to 58'.
					0	33	0			
									SP	SAND WITH SILT - Fine sand with silt and traces of medium to coarse sand, dark orange-brown, moist, some mica.
60					0	11	0		SM	SAND - Fine to coarse sand with some fine gravel and occasional pieces coarse gravel, orange-brown, slightly moist.
									SP	
		G-32			0	9	0			Occasional thin lenses fine to medium sand with some silt from 58.5' to 63'.
										Small cobbles at 64' and 65'.
70					0	32	0			Alternating thin lenses fine to coarse sand with trace silt and some fine gravel and silty fine sand with some medium to coarse sand, orange-brown and dark orange-brown, slightly moist to moist, micaceous from 69.5' to 72.5'.
					0	40	0			
										Large cobble at 77'.
80					-	51	-			Large granitic boulder from 82' to 84.5'.
					0	31	0			
										Large cobbles from 88' to 89.5'.
90					0	13	0			Thin lenses silty fine sand at 90' and 91'.
					0	11	0			Large cobble at 95'.
										Thin lens silty fine sand at 98'.
100					0	41	0			

FOSTER WHEELER ENVIRONMENTAL CORPORATION

B-37

PROJECT *Jet Propulsion Laboratory*
LOCATION *Explorer Road nr E end of Bldg 67*
GEOLOGIST *B.G. Randolph*
DRILLING CO *Boart Longyear*
DATE (start/finish) *4-6-98 / 4-7-98*

DRILLING METHOD *Sonic*
SAMPLING METHOD *Continuous 6-inch Core & Grab*
SURFACE ELEVATION *1195.7 Feet*
TOTAL DEPTH (ft) *193*
DEPTH TO WATER (ft) *189.5*



Depth (ft)	Sample No.	Samples	% Recovery	OVA (ppm) Drill Pipe	OVA (ppm) Sample	OVA (ppm) Breath Zn	Lithology	USCS Symbol	Lithologic Description and Notes
100								SP	GRAVELLY SAND - Fine to coarse sandy fine to coarse gravel with trace silt, dark orange-brown to gray-brown, slightly moist, micaceous.
				0	26	0		SP	Thin lens silty fine sand at 102.5'.
									Large cobbles from 107.5' to 111'.
110				0	35	0			Moist at 111.5'.
									Thin lens silty fine sand at 112.5'.
				–	389	–			Large cobble at 115'.
								SP	SAND - Fine to coarse sand with some fine gravel, orange-brown, slightly moist, micaceous.
120				0	66	0			Occasional pieces coarse gravel from 118.5' to 120.5'.
								SP	GRAVELLY SAND - Fine to coarse sandy fine to coarse gravel with trace silt, dark orange-brown to gray-brown, slightly moist, trace mica.
				0	47	0		GP	
								SP	Cobble at 123.5'.
									Thin lens silty fine sand at 124'.
130				0	23	0			SAND - Fine to coarse sand with some fine gravel and trace silty, orange-brown, slightly moist, micaceous.
								SP	GRAVELLY SAND - Fine to coarse sandy fine to coarse gravel with *some silt, light orange-brown and gray-brown, slightly moist, micaceous.*
				0	19	0		GP	
									Thin lens silty fine sand at 133.5' Large cobble at 134'.
140				0	32	0			Dark orange-brown at 136.5'.
									Mottled dark gray-brown and dark orange-brown at 142.5'.
				0	32	0			Lens silty fine sand at 145'.
150				0	26	0		SP	SAND - Fine to coarse sand with some fine gravel and trace silt, orange-brown, slightly moist, micaceous.
								SM	SILTY SAND - Silty fine sand with *some medium sand and trace coarse* sand, dark orange-brown, moist, micaceous.
				0	106	0		SP	
									SAND - Fine to coarse sand with some fine gravel and trace silt, orange-brown to dark orange-brown, slightly moist to moist, some mica.
160				–	16	–			Occasional pieces coarse gravel from 155.5' to 159'.
									Fine to coarse sand with some fine gravel from 160' to 170'.
				–	10	–			Occasional pieces coarse gravel from 165' to 168'.
									Small cobble at 168'. With fine to coarse gravel 168.5' to 170'.
170				0	6	0			Fine to coarse sand with fine gravel and trace silt, mottled dark orange-brown and gray-brown from 170' to 174.5'.
				2	15	0			Fine to coarse sand with some fine gravel, orange-brown from 174.5' to 180'. Occasional pieces coarse gravel from 173' to 179.5'.
									Small cobbles from 176' to 177.5'.
180				2	6	0			Cobble at 179.5'.
	G-33	⊠							*Fine to coarse sand with fine to coasse gravel from 180' to 190'.*
				–	17	–			Small cobbles at 182.5'.
									Small cobbles at 184'.
190				0	10	0			Core saturated at 189.5'. Fine to coarse sand with some fine gravel and trace silt.
									Total Depth = 193'.
									Water level at 189.5'.
200									

FOSTER WHEELER ENVIRONMENTAL CORPORATION

B-38

PROJECT *Jet Propulsion Laboratory*
LOCATION *Sergeant Road nr W end Bldg 156.*
GEOLOGIST *B.G. Randolph*
DRILLING CO *Boart Longyear*
DATE (start/finish) *4-14-98 / 4-15-98*

DRILLING METHOD *Sonic*
SAMPLING METHOD *Continuous 6-inch Core & Grab*
SURFACE ELEVATION *1185.6 Feet*
TOTAL DEPTH (ft) *178.5*
DEPTH TO WATER (ft) *176.0*

Depth (ft)	Soil-Vapor Well Completion	Sample No.	Samples	% Recovery	OVA (ppm) Drill Pipe	OVA (ppm) Sample	OVA (ppm) Breath Zn	Lithology	USCS Symbol	Lithologic Description and Notes
0									GP	ASPHALT pavement (3 inches thick).
									SP	Gravel base for pavement.
					–	3	–			SAND (FILL) – Fine to coarse sand with some fine gravel, dark gray to gray-brown, slightly moist.
									SP	SAND – Fine to coarse sand with some fine gravel and trace silt, dark orange-brown, moist, micaceous.
10					0	10	0			Small cobbles at 10'.
					0	12	0			Large cobbles at 11'.
										Large cobble at 15'.
										Highly decomposed granitic cobbles from 17' to 18'.
20					0	14	0			Large cobble at 22'.
					–	30	–			Fine to coarse sand with some silt and fine gravel, occasional pieces coarse gravel, slightly moist from 24.5' to 27'.
30					–	10	–			Fine gravel fine to coarse sand with trace silt, dark orange-brown to brown to gray-brown, slightly moist, micaceous.
										Large cobble at 29.5'.
					0	30	0			Large cobble at 31.5'.
										Lens fine to mediums sand with some coarse sand at 33'.
40		G-38			0	15	0			Fine gravel fine to coarse sand, dark orange-brown.
										Large granitic and shcistose cobbles from 41' to 43'.
					–	77	–			Large granitic cobble at 45'.
										Fine to medium sand with some coarse sand and fine gravel from 46' to 48'.
50					0	13	0			Large granitic cobble at 51'.
					0	10	0			Small cobbles at 55'.
										Fine to medium sand with some coarse sand and fine gravel.
60					0	14	0			Fine gravel fine to coarse sand, light orange-brown, damp, trace mica.
					0	10	0			Large granitic cobbles at 64.5'.
										Occasional small cobbles from 66' to 68'.
70					0	7	0			
					0	6	0			
										Small cobbles at 77'.
80					0	14	0			Small cobbles at 80'.
					–	4	–			Fine to medium sand with some coarse sand and fine gravel, orange-brown, slightly moist, micaceous.
										Thin lenses silty fine sand at 86' and 87'.
90					0	19	0		SM	SILTY SAND – Silty fine to coarse sand with occasional pieces fine gravel, orange-brown, moist, micaceous.
										Dark reddish-bown at 89'.
					0	101	0			Dark orange-brown at 94'.
										Very moist at 97.5'.
100					0	33	0			With trace clay at 98'.

FOSTER WHEELER ENVIRONMENTAL CORPORATION

B-38

PROJECT Jet Propulsion Laboratory
LOCATION Sergeant Road nr W end Bldg 156.
GEOLOGIST B.G. Randolph
DRILLING CO Boart Longyear
DATE (start/finish) 4-14-98 / 4-15-98

DRILLING METHOD Sonic
SAMPLING METHOD Continuous 6-inch Core & Grab
SURFACE ELEVATION 1185.6 Feet
TOTAL DEPTH (ft) 178.5
DEPTH TO WATER (ft) 176.0

Depth (ft)	Soil-Vapor Well Completion	Sample No.	Samples	% Recovery	OVA (ppm) Drill Pipe	OVA (ppm) Sample	OVA (ppm) Breath Zn	Lithology	USCS Symbol	Lithologic Description and Notes
100									SM	SAND - Fine to coarse sand with some silt and fine gravel, orange-brown, moist, micaceous.
					0	42	0		SP	Small cobble at 103'.
110					-	33	-		SM	SILTY SAND - Silty fine to coarse sand with some fine gravel and occasional pieces coarse gravel, mottled dark orange-brown and red-brown, moist, micaceous.
										Small cobbles at 110' and 112.5'.
					0	429	0		SP	SAND WITH SILT AND SILTY SAND - Alternating thin lenses fine to coarse sand with silt and some fine gravel and silty fine to coarse sand with some fine gravel, orange-brown to dark orange-brown, moist to very moist, some mica.
120					0	12	0		SM	
									SP	SAND - Fine to coarse sand with some fine gravel and trace silt, moist, orange-brown, micaceous.
					0	24	0			Small cobble at 124'.
										Occasional pieces coarse gravel from 126' to 129.5' and occasional small cobbles from 128.5' to 144'.
130					-	33	-			Gravelly fine to coarse sand with trace silt from 130' to 132'.
					0	-	0			Fine to medium sand with trace coarse sand, dark orange-brown, very moist from 132.5' to 134'.
					0	41	0			Thin lenses of silty fine to medium sand at 133.5' and 138.5'.
140		G-39			0	48	0			Small cobble at 140.5'.
					0	30	0			Occasional pieces coarse gravel from 144' to 154'.
										Thin lens silty fine to coarse sand at 148'.
150					0	22	0			Small cobbles at 149' and 151.5'.
										Thin lens silty fine to coarse sand, very moist at 151'.
					0	122	0			Thin lens silty fine to medium sand at 152.5'.
										Fine to medium sand with some silt, dark orange-brown, very moist from 153' to 155'.
160					0	28	0			Thin lens silty fine to coarse sand at 156.5'.
										Large cobble at 157.5'.
					-	43	-			Fine to medium sand, slightly moist at 158'.
										Fine to coarse sand with some fine gravel and occasional pieces coarse gravel, most from 159.5' to 178.5'.
170					-	38	-			Thin layer gravelly fine to coarse sand at 165.5'.
										Small cobble at 169'.
					0	33	0			Very moist at 169.5' and wet at 176'.
										Core saturated at 177'.
180										Total Depth = 178.5' Water level at 176.0'.
190										
200										

FOSTER WHEELER ENVIRONMENTAL CORPORATION

B-39

PROJECT *Jet Propulsion Laboratory*
LOCATION *East of Bldg. 301*
GEOLOGIST *B.G. Randolph*
DRILLING CO *Boart Longyear*
DATE (start/finish) *4-16-98 / 4-17-98*

DRILLING METHOD *Sonic*
SAMPLING METHOD *Continuous 6-inch Core & Grab*
SURFACE ELEVATION *1144.1 Feet*
TOTAL DEPTH (ft) *138*
DEPTH TO WATER (ft) *132.3*

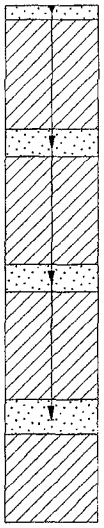
Depth (ft)	Soil-Vapor Well Completion	Sample No.	Samples	% Recovery	OVA (ppm) Drill Pipe	OVA (ppm) Sample	OVA (ppm) Breath Zn	Lithology	USCS Symbol	Lithologic Description and Notes
0									GP	ASPHALT pavement (3 inches thick).
									SP	Gravel base for pavement.
					-	-	-		SM	SAND AND SILTY SAND (FILL) - Mixed thin layers of fine to coarse sand with silt and silty fine to coarse sand with some fine gravel, very dark brown and gray-brown, occasional small pieces asphalt (1/8" to 3/4"), from 2' to 9.5', very moist.
10					-	-	-			Fine to coarse sand with trace silt, dark orange-brown.
									SP	SAND - Fine to coarse sand with trace silt and some fine gravel, orange-brown, moist, micaceous.
					0	5	0			Lens silty fine to coarse sand, dark orange-brown at 14.5'.
20					0	12	0			Thin lens silty fine to medium sand with some coarse sand and fine gravel at 20'.
					0	6	0		SM	SILTY SAND - Silty fine to coarse sand with some fine gravel, mottled orange-brown and dark orange-brown with some gray-brown, moist to very moist, micaceous.
30					0	4	0		GP	SANDY GRAVEL - Fine to coarse sandy fine to coarse gravel with cobbles; mottled gray, gray-brown, pale yellow brown, and orange-brown; slightly moist.
					0	64	0			Numerous cobbles from 35' to 40'.
40					-	26	-		SM	SILTY SAND - Silty fine to medium sand with some coarse sand and trace fine gravel, dark orange-brown to green-brown, moist, micaceous.
					0	27	0			Lens fine to medium sand with some coarse sand at 45'.
50					0	25	0			Thin lnes fine to medium sand with some coarse sand at 49.5'.
										Thin lens fine to coarse sand with some fine gravel at 52'.
					0	7	0		SP SM	SAND AND SILTY SAND - Alternating thin lenses fine to coarse sand with some silt and silty fine to medium sand with some coarse sand and occasional pieces fine gravel, dark orange-brown to light brown, moist, micaceous.
60					0	20	0			
					0	40	0		SM	SILTY SAND - Silty fine to medium sand with some coarse sand and fine gravel, dark orange-brown to green-brown, moist, micaceous.
									SP	SAND - Fine to coarse sand with some fine gravel, light orange- brown to light brown, slightly moist, trace mica.
70					0	30	0			Small cobbles from 70.5' to 72'.
		G-40								Fine to medium sand with some silt; brown, moist from 72' to 74'.
					-	10	-		SM	SILTY SAND - Silty fine to medium sand with some coarse sand and fine gravel, reddish-brown, moist, micaceous.
80					0	19	0			Thin lens fine to coarse sand at 79'.
									SP	SAND - Fine to coarse sand with trace silt and some fine gravel, dark orange-brown to light grayish-brown, slighty moist, micaceous.
					0	86	0		SM	SILTY SAND - Silty fine to medium sand with some coarse sand and fine gravel, dark orange-brown to light grayish-brown, slightly moist, micaceous.
90					0	13	0		SP	SAND - Fine to coarse sand with some fine gravel and trace silt, dark orange-brown to light grayish brown, slightly moist, micaceous.
					0	14	0			Large granitic cobble at 94'.
										Thin lens silty fine sand at 98.5'.
100					0	28	0			

FOSTER WHEELER ENVIRONMENTAL CORPORATION

B-39

PROJECT Jet Propulsion Laboratory
LOCATION East of Bldg. 301
GEOLOGIST B.G. Randolph
DRILLING CO Boart Longyear
DATE (start/finish) 4-16-98 / 4-17-98

DRILLING METHOD Sonic
SAMPLING METHOD Continuous 6-inch Core & Grab
SURFACE ELEVATION 1144.1 Feet
TOTAL DEPTH (ft) 138
DEPTH TO WATER (ft) 132.3

Depth (ft)	Soil-Vapor Well Completion	Sample No.	Samples	% Recovery	OVA (ppm) Drill Pipe	OVA (ppm) Sample	OVA (ppm) Breath Zn	Lithology	USCS Symbol	Lithologic Description and Notes
100									SP	Small cobbles from 100' to 102'.
					0	21	0		SM	SILTY SAND - Silty fine to coarse sand with some fine gravel, dark orange-brown to green-brown, moist, micaceous.
									SP	SAND - Fine to coarse sand with some silt and fine gravel, dark brown to orange-brown, moist, micaceous.
110					0	24	0		SM	SILTY SAND - Silty fine to medium sand with some coarse sand and fine gravel, dark-brown to green-brown, moist, micaceous.
					0	27	0		SP	SAND - Fine to coarse sand with fine gravel and trace sand, orange-brown to light gray, slightly moist, micaceous.
120					0	44	0			Large granitic cobble at 118'.
										Numerous small and large cobbles from 119' to 122.5'.
					0	16	0			Orange-brown to dark orange-brown and moist at 127'.
130					0	85	0			Occasional pieces coarse gravel from 128' to 136'.
										Fine to coarse sand with some silt and fine gravel.
					0	29	0			Core saturated at 132.5'.
										Thin lens silty fine sand with some medium and coarse sand at 137'.
140										Total Depth = 138' Water level at 132.3'.
150										
160										
170										
180										
190										
200										

FOSTER WHEELER ENVIRONMENTAL CORPORATION

BG-1

PROJECT *Jet Propulsion Laboratory*
LOCATION *West Parking Lot*
GEOLOGIST *B.G. Randolph*
DRILLING CO *Beylik Drilling*
DATE (start/finish) *4-6-94 / 4-6-94*

DRILLING METHOD *Hollow Stem Auger*
SAMPLING METHOD *2 1/2-inch split-spoon*
SURFACE ELEVATION *1190.7 Feet*
TOTAL DEPTH (ft) *25.5*
DEPTH TO WATER (ft) *Not Encountered*

Depth (ft)	Soil-Vapor Well Completion	Sample No.	Samples	% Recovery	OVA (ppm) Drill Pipe	OVA (ppm) Sample	OVA (ppm) Breath Zn	Lithology	USCS Symbol	Lithologic Description and Notes
0									GM	Asphalt pavement (3-inches thick).
										Gravel base for pavement.
									SP	SAND (FILL) - Fine to coarse sand with trace silt and occasional pieces fine gravel, dark orange-brown, damp, dense.
5										
									SP	SAND - Fine to coarse sand with trace silt, reddish-brown, slightly moist, dense, micaceous.
10										Occasional pieces fine gravel from 10' to 15'.
										Orange-brown from 12' to 15', becoming more silty.
15										
										Light orange-brown at 17', very dense.
20										
25		SS-1		100	-	-	-			Fine to medium sand with some silt and coarse sand and trace fine gravel, light orange-brown, damp, very dense, micaceous.
30										
35										
40										
45										
50										

FOSTER WHEELER ENVIRONMENTAL CORPORATION

BG-1A

PROJECT *Jet Propulsion Laboratory*
LOCATION *West Parking Lot*
GEOLOGIST *B.G. Randolph*
DRILLING CO *Beylik Drilling*
DATE (start/finish) *10-1-94 / 10-1-94*

DRILLING METHOD *Hollow Stem Auger*
SAMPLING METHOD *2 1/2-inch split-spoon*
SURFACE ELEVATION *1190.7 Feet*
TOTAL DEPTH (ft) *21.5*
DEPTH TO WATER (ft) *Not Encountered*

Depth (ft)	Soil-Vapor Well Completion	Sample No.	Samples	% Recovery	OVA (ppm) Drill Pipe	OVA (ppm) Sample	OVA (ppm) Breath Zn	Lithology	USCS Symbol	Lithologic Description and Notes
0									GP	Asphalt pavement (3-inches thick).
									GP	Gravel base for pavement.
									SP	SAND (FILL) - Fine to coarse sand with trace silt and occasional pieces fine gravel, dark orange-brown, damp, dense.
5										
									SP	SAND - Fine to coarse sand with trace silt, reddish-brown, slightly moist, dense, micaceous.
10										Tree roots in cuttings at 9.5'.
										Occasional pieces fine gravel from 10' to 17'.
										Orange-brown 12' to 17', more silty.
15										
										Light orange-brown at 17'.
20		SS-3		100	-	-	-			Fine to medium sand with trace silt, light orange-brown, damp to slightly moist, micaceous.
		SS-4		100	-	-	-			
25										
30										
35										
40										
45										
50										

FOSTER WHEELER ENVIRONMENTAL CORPORATION

BG-2

PROJECT *Jet Propulsion Laboratory*
LOCATION *West Parking Lot - Upper Terrace*
GEOLOGIST *B.G. Randolph*
DRILLING CO *Beylik Drilling*
DATE (start/finish) *4-6-94 / 4-6-94*

DRILLING METHOD *Hollow Stem Auger*
SAMPLING METHOD *2 1/2-inch split-spoon*
SURFACE ELEVATION *1265.2 Feet*
TOTAL DEPTH (ft) *18.5*
DEPTH TO WATER (ft) *Not Encountered*

Depth (ft)	Soil-Vapor Well Completion	Sample No.	Samples	% Recovery	OVA (ppm) Drill Pipe	OVA (ppm) Sample	OVA (ppm) Breath Zn	Lithology	USCS Symbol	Lithologic Description and Notes
0									GP	Asphalt pavement (3-inches thick).
									GP	Gravel base for pavement.
									SM	SILTY SAND - Silty fine to medium sand with trace coarse sand and fine gravel, very dark orange-brown, damp to slightly moist, dense.
5										
10									SM	GRAVELLY SILTY SAND - Fine gravelly silty fine to medium sand with trace coarse sand, orange-brown, moist, dense, micaceous.
									SP	SAND - Fine to medium sand with some silt and trace coarse sand moist, dense, micaceous.
15									SP	GRAVELLY SAND - Fine gravelly fine to medium sand with coarse sand and trace silt, light orange-brown, damp, very dense, micaceous.
		SS-2		100	-	-	-			
20										
25										
30										
35										
40										
45										
50										

FOSTER WHEELER ENVIRONMENTAL CORPORATION

BG-2A

PROJECT *Jet Propulsion Laboratory*
LOCATION *West Parking Lot - Upper Terrace*
GEOLOGIST *B.G. Randolph*
DRILLING CO *Beylik Drilling*
DATE (start/finish) *10-1-94 / 10-1-94*

DRILLING METHOD *Hollow Stem Auger*
SAMPLING METHOD *2 1/2-inch split-spoon*
SURFACE ELEVATION *1265.2 Feet*
TOTAL DEPTH (ft) *18.5*
DEPTH TO WATER (ft) *Not Encountered*

Depth (ft)	Soil-Vapor Well Completion	Sample No.	Samples	% Recovery	OVA (ppm) Drill Pipe	OVA (ppm) Sample	OVA (ppm) Breath Zn	Lithology	USCS Symbol	Lithologic Description and Notes
0									GP	Asphalt pavement (3-inches thick).
									GP	Gravel base for pavement.
									SM	SILTY SAND - Silty fine to medium sand with trace coarse sand and fine gravel, very dark orange-brown, slightly moist, dense.
5										
									SM	GRAVELLY SILTY SAND - Fine gravelly silty fine to medium sand with some coarse sand, orange-brown, moist, dense, micaceous.
10									SP	SAND - Fine to medium sand with some silt, and coarse sand and fine gravel, orange-brown, moist, dense, micaceous.
									SP	GRAVELLY SAND - Fine gravelly fine to coarse sand with trace silt, light orange-brown, slightly mosit, very dense, micaceous.
15		SS-5		100	-	-	-			
20										
25										
30										
35										
40										
45										
50										

APPENDIX A2

TEST PIT LOGS

FOSTER WHEELER ENVIRONMENTAL CORPORATION

Test Pit 1

PROJECT *Jet Propulsion Laboratory*
LOCATION *Dishcharge Point No. 4 (DP-4)*
GEOLOGIST *B.G. Randolph*
DRILLING CO *Boart Longyear*
DATE (start/finish) *4-14-97 / 4-14-97*

DRILLING METHOD *Backhoe with 24-inch bucket*
SAMPLING METHOD *Grab*
SURFACE ELEVATION *1097.2 Feet*
TOTAL DEPTH (ft) *5.7*
DEPTH TO WATER (ft)

Depth (ft)	Soil-Vapor Well Completion	Sample No.	Samples	% Recovery	OVA (ppm) Drill Pipe	OVA (ppm) Sample	OVA (ppm) Breath Zn	Lithology	USCS Symbol	Lithologic Description and Notes
0									SP	SAND – Fine to coarse sand with fine to coarse gravel and cobbles, and trace silt; light gray-brown and gray-brown, slightly moist.
1										
2		VPSS-161	⊠						GP	SANDY GRAVEL – Fine to coarse sand fine to coarse gravel with small to large cobbles and boulders, mottled gray-brown and orange-brown, slightly moist to moist.
3										Lens silty fine sand with some medium sand between cobbles and boulders at 2.3'.
4										
5		VPSS-160	⊠							Large boulders in side walls.
										Sample from soil matrix between cobbles and boulders.
6										Total Depth = 5.7
7										
8										
9										
10										
11										
12										
13										
14										
15										
16										
17										
18										
19										
20										

FOSTER WHEELER ENVIRONMENTAL CORPORATION

Test Pit 2

PROJECT *Jet Propulsion Laboratory*
LOCATION *Dishcharge Point No. 1*
GEOLOGIST *B.G. Randolph*
DRILLING CO *Boart Longyear*
DATE (start/finish) *4-14-97 / 4-14-97*

DRILLING METHOD *BackHoe with 24-inch bucket*
SAMPLING METHOD *Grab*
SURFACE ELEVATION *1094.4 Feet*
TOTAL DEPTH (ft) *5.7*
DEPTH TO WATER (ft)

Depth (ft)	Soil-Vapor Well Completion	Sample No.	Samples	% Recovery	OVA (ppm) Drill Pipe	OVA (ppm) Sample	OVA (ppm) Breath Zn	Lithology	USCS Symbol	Lithologic Description and Notes
0									GP	SANDY GRAVEL - Fine to coarse sand fine to coarse gravel with cobbles and some boulders and trace silty, mottled light gray-brown to dark gray-brown, moist, numerous in west wall surface to approx. 1'.
1		VPSS-162	X							Sample from soil matrix between cobbles in west and north walls from 1' to 1.4'.
2										Mottled dark gray-brown and orange-brown at 1.5'
3										Boulders 22" diam. from 1.5' to 3' with cobbles, moist.
4										Boulder larger than 3' across at N end of test pit.
5		VPSS-163	X							Cobbles and small boulders from 3' to 5.5'.
6										*Free moisture seeping from sand on top of small boulder in west wall at 4.5'.*
7										Sample from sand matrix from west and east walls from 5' to 5.5'.
8										Total Depth = 5.7
9										
10										
11										
12										
13										
14										
15										
16										
17										
18										
19										
20										

FOSTER WHEELER ENVIRONMENTAL CORPORATION

Test Pit 3

PROJECT *Jet Propulsion Laboratory*
LOCATION *Dishcharge Point No. 3*
GEOLOGIST *B.G. Randolph*
DRILLING CO *Boart Longyear*
DATE (start/finish) *4-14-97 / 4-14-97*

DRILLING METHOD *Backhoe with 24-inch bucket*
SAMPLING METHOD *Grab*
SURFACE ELEVATION *1058.5 Feet*
TOTAL DEPTH (ft) *6.5*
DEPTH TO WATER (ft)

Depth (ft)	Soil-Vapor Well Completion	Sample No.	Samples	% Recovery	OVA (ppm) Drill Pipe	OVA (ppm) Sample	OVA (ppm) Breath Zn	Lithology	USCS Symbol	Lithologic Description and Notes
0									SM	SILTY SAND – Silty fine to coarse sand with fine to coarse gravel and occasional small cobbles, light gray-brown, slightly moist, numerous roots.
1										
2		VPSS-164	☒						SP	SAND – Fine to coarse sand with fine to coarse gravel and occasional small cobbles, trace silt; mottled light gray-brown, gray-brown, and orange-brown; slightly moist.
3										Small lens fine sand in N wall at 2.3'.
4										Fine to coarse sand with some fine gravel from 2.7' to 3.5'.
5		VPSS-165	☒							Gravelly sand with numerous cobbles and occasional boulder.
6										Fine to medium sand with some silt, moist, orange-brown, micaceous from 4.8' to 5.7'.
7										Mottled gray-brown and orange-brown below 5.7'.
8										Total Depth = 6.5
9										
10										
11										
12										
13										
14										
15										
16										
17										
18										
19										
20										

FOSTER WHEELER ENVIRONMENTAL CORPORATION

Test Pit 1A

PROJECT *Jet Propulsion Laboratory*
LOCATION *Dishcharge Point No. 4 (DP-4)*
GEOLOGIST *B.G. Randolph*
DRILLING CO *Wayne Perry, Inc.*
DATE (start/finish) *6-10-99 / 6/10/99*

DRILLING METHOD *Backhoe with 24-inch bucket*
SAMPLING METHOD *Grab*
SURFACE ELEVATION *1097.0 Feet*
TOTAL DEPTH (ft) *5.8*
DEPTH TO WATER (ft)

Depth (ft)	Soil-Vapor Well Completion	Sample No.	Samples	% Recovery	OVA (ppm) Drill Pipe	OVA (ppm) Sample	OVA (ppm) Breath Zn	Lithology	USCS Symbol	Lithologic Description and Notes
0									SP	SAND – Fine to coarse sand with fine to coarse gravel and trace silt and few cobbles, light grayish-brown to gray brown with some orange-brown mottling, slightly moist.
1										
2		VPSS-166	☒						GP	SANDY GRAVEL – Fine to coarse sand fine to coarse gravel with cobbles and small boulders, mottled gray-brown and orange-brown, slightly moist to moist.
3										
4										Numerous small to large cobbles and boulders from 3' to 5.5'.
5		VPSS-167	☒							Small pockets of fine sand with some silt from 5.4' to 5.6'.
6										
7										Total Depth = 5.8
8										Note: Samples collected from north end and west wall of test pit since east wall is backfill material for Test Pit No. 1. Samples from sandy matrix between gravel, cobbles, and boulders.
9										
10										
11										
12										
13										
14										
15										
16										
17										
18										
19										
20										

FOSTER WHEELER ENVIRONMENTAL CORPORATION

Test Pit 2A

PROJECT *Jet Propulsion Laboratory*
LOCATION *Dishcharge Point No. 1 (DP-1)*
GEOLOGIST *B.G. Randolph*
DRILLING CO *Wayne Perry, Inc.*
DATE (start/finish) *6-10-99 / 6/10/99*

DRILLING METHOD *Backhoe with 24-inch bucket*
SAMPLING METHOD *Grab*
SURFACE ELEVATION *1094.4 Feet*
TOTAL DEPTH (ft) *6*
DEPTH TO WATER (ft)

Depth (ft)	Soil-Vapor Well Completion	Sample No.	Samples	% Recovery	OVA (ppm) Drill Pipe	OVA (ppm) Sample	OVA (ppm) Breath Zn	Lithology	USCS Symbol	Lithologic Description and Notes
0									SP SM	SAND WITH SILT – Fine to medium sand with silt, dark gray-brown, v. moist, decayed vegetation and roots.
1									GP	SANDY GRAVEL – fine to coarse sandy fine to coarse gravel, with cobbles, small boulders, and trace silt; mottled light gray-brown to dark orange-brown, moist.
2		VPSV-168	⊠							
3										Numerous boulders from 3' to 4.5'.
4										
5		VPSV-169	⊠							Mottled orange-brown and light to dark gray-brown from 4' to 6'.
6										Total Depth = 6
7										Note: Samples collected from west wall of test pit since east wall is backfill material for Test Pit No. 2. Samples from sandy matrix between gravel and cobbles.
8										
9										
10										
11										
12										
13										
14										
15										
16										
17										
18										
19										
20										

FOSTER WHEELER ENVIRONMENTAL CORPORATION

Test Pit 3A

PROJECT *Jet Propulsion Laboratory*
LOCATION *Dishcharge Point No. 3 (DP-3)*
GEOLOGIST *B.G. Randolph*
DRILLING CO *Wayne Perry, Inc.*
DATE (start/finish) *6-10-99 / 6/10/99*

DRILLING METHOD *Backhoe with 24-inch bucket*
SAMPLING METHOD *Grab*
SURFACE ELEVATION *1058.3 Feet*
TOTAL DEPTH (ft) *6*
DEPTH TO WATER (ft)

Depth (ft)	Soil-Vapor Well Completion	Sample No.	Samples	% Recovery	OVA (ppm) Drill Pipe	OVA (ppm) Sample	OVA (ppm) Breath Zn	Lithology	USCS Symbol	Lithologic Description and Notes
0									SM	SILTY SAND - Silty fine to coarse sand with fine to coarse gravel and occasional cobbles; light gray-brown, slightly moist, numerous roots to 1'.
1										
2		VPSS-170	☒						SP GP	GRAVELLY SAND - Fine to coarse sand with fine to coarse gravel and occasional cobbles, trace silt; mottled light orange-brown, dark orange-brown, and gray-brown; slightly moist to moist.
3										
4										
5		VPSS-171	☒							Numerous pieces coarse gravel, small to large cobbles, and small boulders from 3.5' to 6'.
6										Total Depth = 6
7										Note: Samples collected from west end and north wall of test pit since south wall is backfill material for Test Pit No. 3.
8										
9										
10										
11										
12										
13										
14										
15										
16										
17										
18										
19										
20										

APPENDIX A3

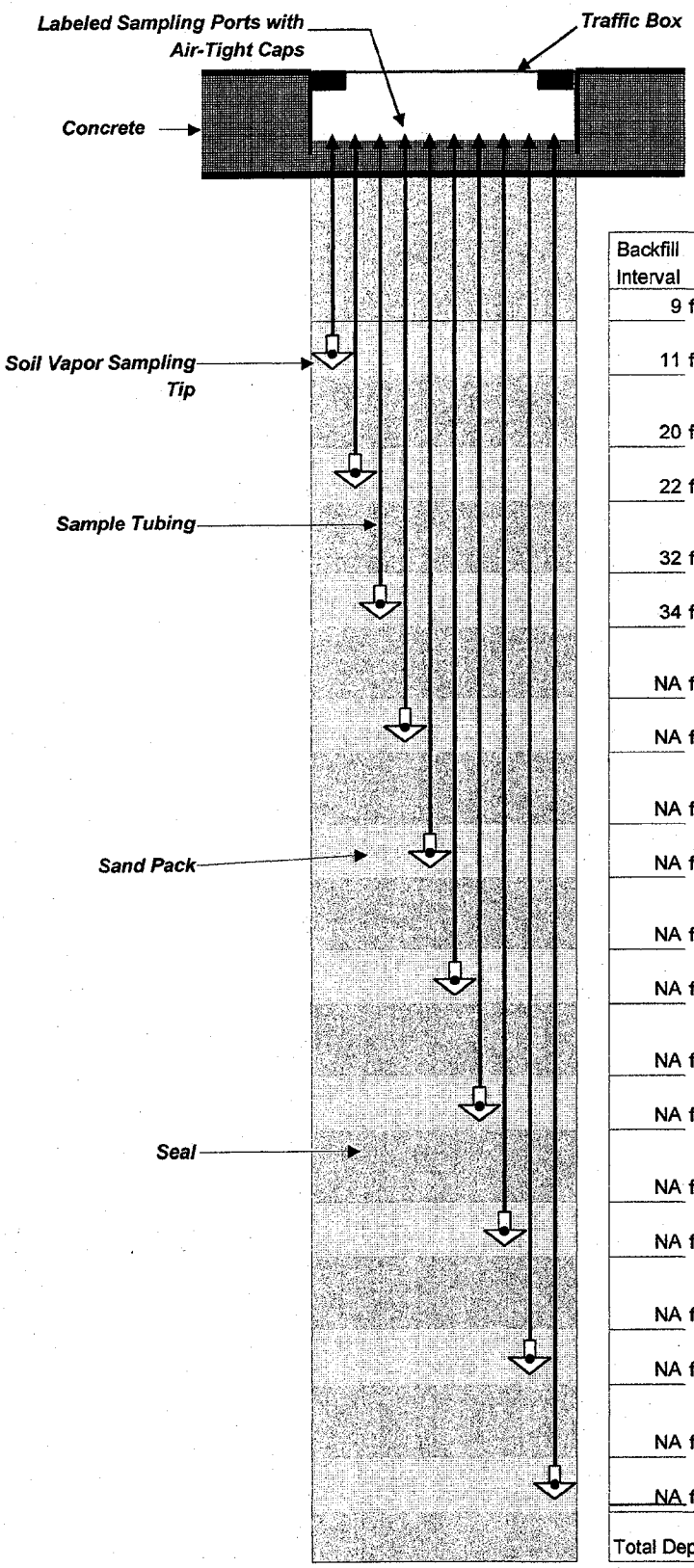
SOIL VAPOR WELL CONSTRUCTION DIAGRAMS

SOIL VAPOR WELL CONSTRUCTION LOG

SOIL VAPOR WELL NUMBER: 1

WELL TYPE: Soil Vapor Monitoring Well

SURFACE ELEVATION (feet above MSL): 1124.5



Backfill Interval	Sampling Depth
9 ft.	
11 ft.	10 ft.
20 ft.	
22 ft.	21 ft.
32 ft.	
34 ft.	33 ft.
NA ft.	
NA ft.	NA ft.
NA ft.	
NA ft.	NA ft.
NA ft.	
NA ft.	NA ft.
NA ft.	
NA ft.	NA ft.
NA ft.	
NA ft.	NA ft.
NA ft.	
NA ft.	NA ft.
NA ft.	
NA ft.	NA ft.
Total Depth	38 ft.

DRILLING SUMMARY

DATE COMPLETED: 8/30/94

DRILLING COMPANY: Beylik Drilling

DRILLING RIG TYPE: Percussion Hammer

TOTAL DEPTH DRILLED: 38 feet

CONSTRUCTION DETAILS

BOREHOLE DIAMETER: 10 inches

TOTAL NO. OFSAMPLING PORTS: 3

SAND PACK: RMC Lonestar #3

SEAL MATERIAL: Enviroplug No. 16

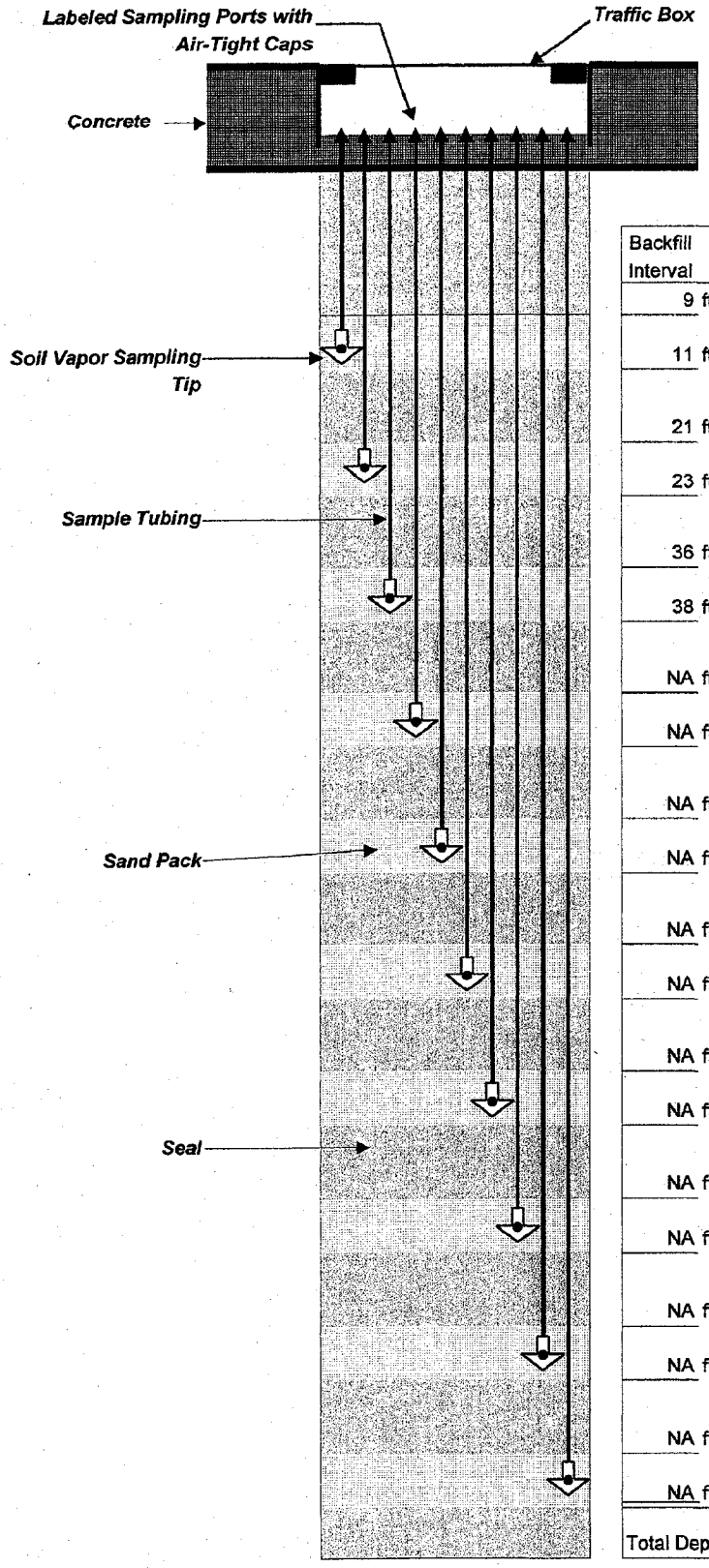
COMMENTS:

SOIL VAPOR WELL CONSTRUCTION LOG

SOIL VAPOR WELL NUMBER: 2

WELL TYPE: Soil Vapor Monitoring Well

SURFACE ELEVATION (feet above MSL): 1126.2



Backfill Interval	Sampling Depth
9 ft.	
11 ft.	10 ft.
21 ft.	
23 ft.	22 ft.
36 ft.	
38 ft.	37 ft.
NA ft.	
NA ft.	NA ft.
NA ft.	
NA ft.	NA ft.
NA ft.	
NA ft.	NA ft.
NA ft.	
NA ft.	NA ft.
NA ft.	
NA ft.	NA ft.
NA ft.	
NA ft.	NA ft.
NA ft.	
NA ft.	NA ft.
Total Depth	38.5 ft.

DRILLING SUMMARY

DATE COMPLETED: 8/30/94

DRILLING COMPANY: Beylik Drilling

DRILLING RIG TYPE: Percussion Hammer

TOTAL DEPTH DRILLED: 38.5 feet

CONSTRUCTION DETAILS

BOREHOLE DIAMETER: 10 inches

TOTAL NO. OFSAMPLING PORTS: 3

SAND PACK: RMC Lonestar #3

SEAL MATERIAL: Enviroplug No. 16

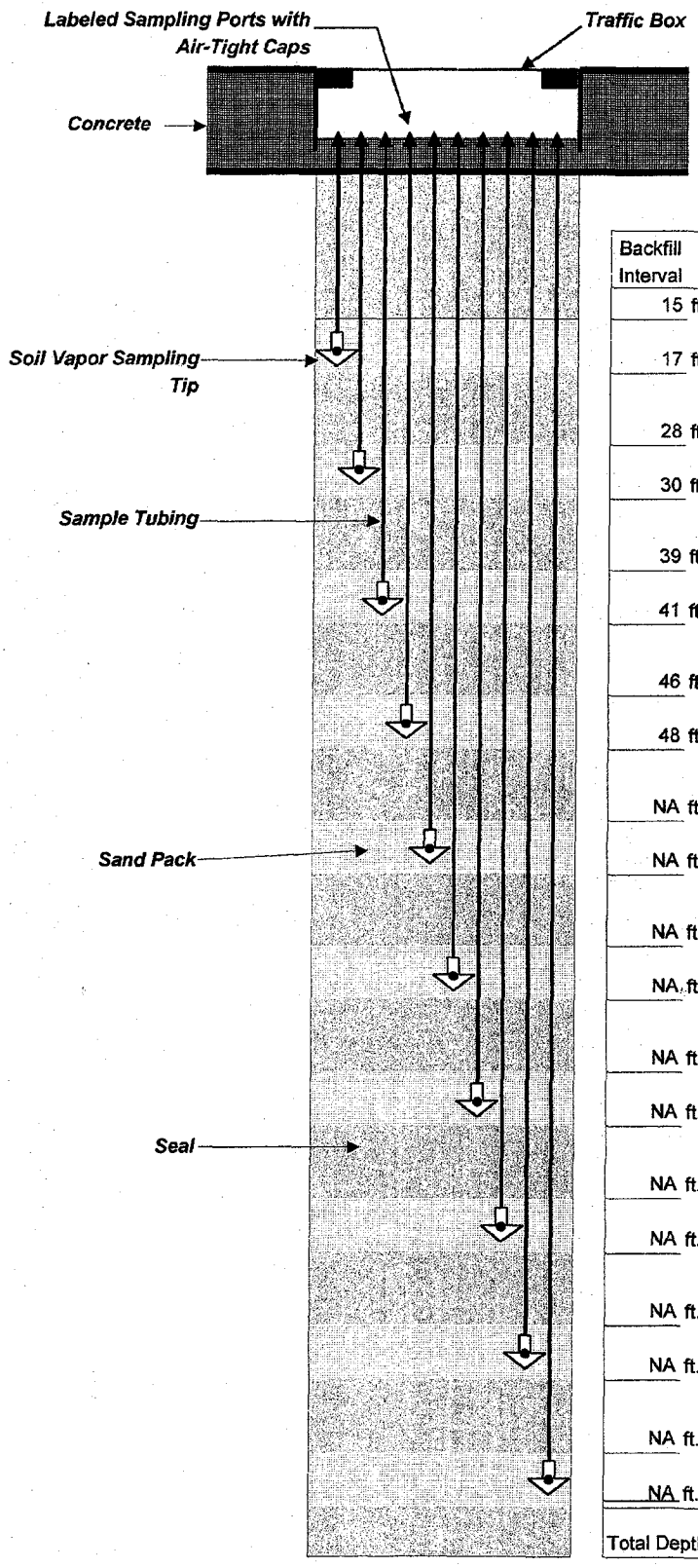
COMMENTS:

SOIL VAPOR WELL CONSTRUCTION LOG

SOIL VAPOR WELL NUMBER: 3

WELL TYPE: Soil Vapor Monitoring Well

SURFACE ELEVATION (feet above MSL): 1133.9



Backfill Interval	Sampling Depth
15 ft.	
17 ft.	16 ft.
28 ft.	
30 ft.	29 ft.
39 ft.	
41 ft.	40 ft.
46 ft.	
48 ft.	47 ft.
NA ft.	
NA ft.	NA ft.
NA ft.	
NA ft.	NA ft.
NA ft.	
NA ft.	NA ft.
NA ft.	
NA ft.	NA ft.
NA ft.	
NA ft.	NA ft.
NA ft.	
NA ft.	NA ft.
Total Depth	52 ft.

DRILLING SUMMARY

DATE COMPLETED: 9/1/94

DRILLING COMPANY: Beylik Drilling

DRILLING RIG TYPE: Percussion Hammer

TOTAL DEPTH DRILLED: 52 feet

CONSTRUCTION DETAILS

BOREHOLE DIAMETER: 10 inches

TOTAL NO. OFSAMPLING PORTS: 4

SAND PACK: RMC Lonestar #3

SEAL MATERIAL: Enviroplug No. 16

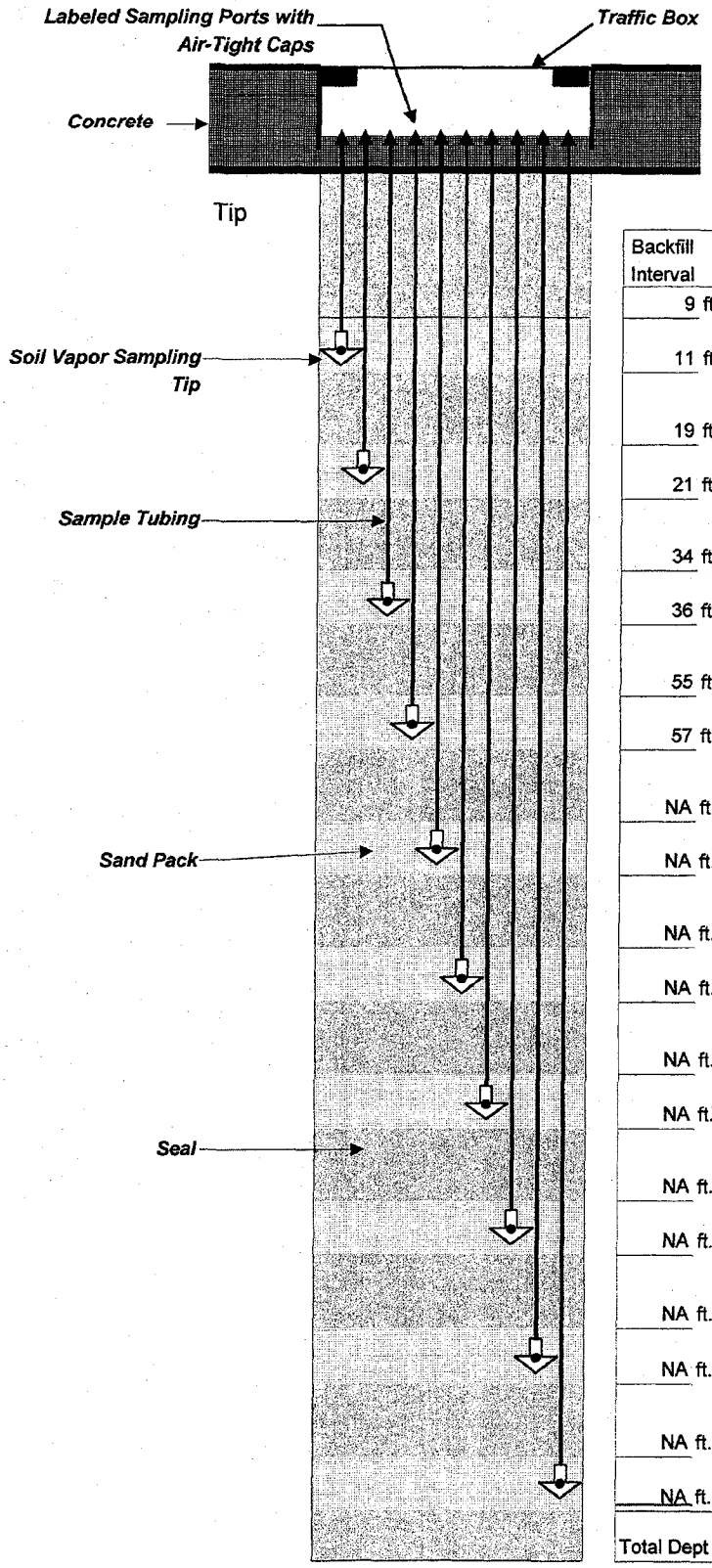
COMMENTS:

SOIL VAPOR WELL CONSTRUCTION LOG

SOIL VAPOR WELL NUMBER: 4

WELL TYPE: Soil Vapor Monitoring Well

SURFACE ELEVATION (feet above MSL): 1137.6



Backfill Interval	Sampling Depth
9 ft.	
11 ft.	11 ft.
19 ft.	
21 ft.	20 ft.
34 ft.	
36 ft.	35 ft.
55 ft.	
57 ft.	56 ft.
NA ft.	
NA ft.	NA ft.
NA ft.	
NA ft.	NA ft.
NA ft.	
NA ft.	NA ft.
NA ft.	
NA ft.	NA ft.
NA ft.	
NA ft.	NA ft.
NA ft.	
NA ft.	NA ft.
Total Dept	60.5 ft.

DRILLING SUMMARY

DATE COMPLETED: 9/2/94

DRILLING COMPANY: Beylik Drilling

DRILLING RIG TYPE: Percussion Hammer

TOTAL DEPTH DRILLED: 60.5 feet

CONSTRUCTION DETAILS

BOREHOLE DIAMETER: 10 inches

TOTAL NO. OFSAMPLING PORTS: 4

SAND PACK: RMC Lonestar #3

SEAL MATERIAL: Enviroplug No. 16

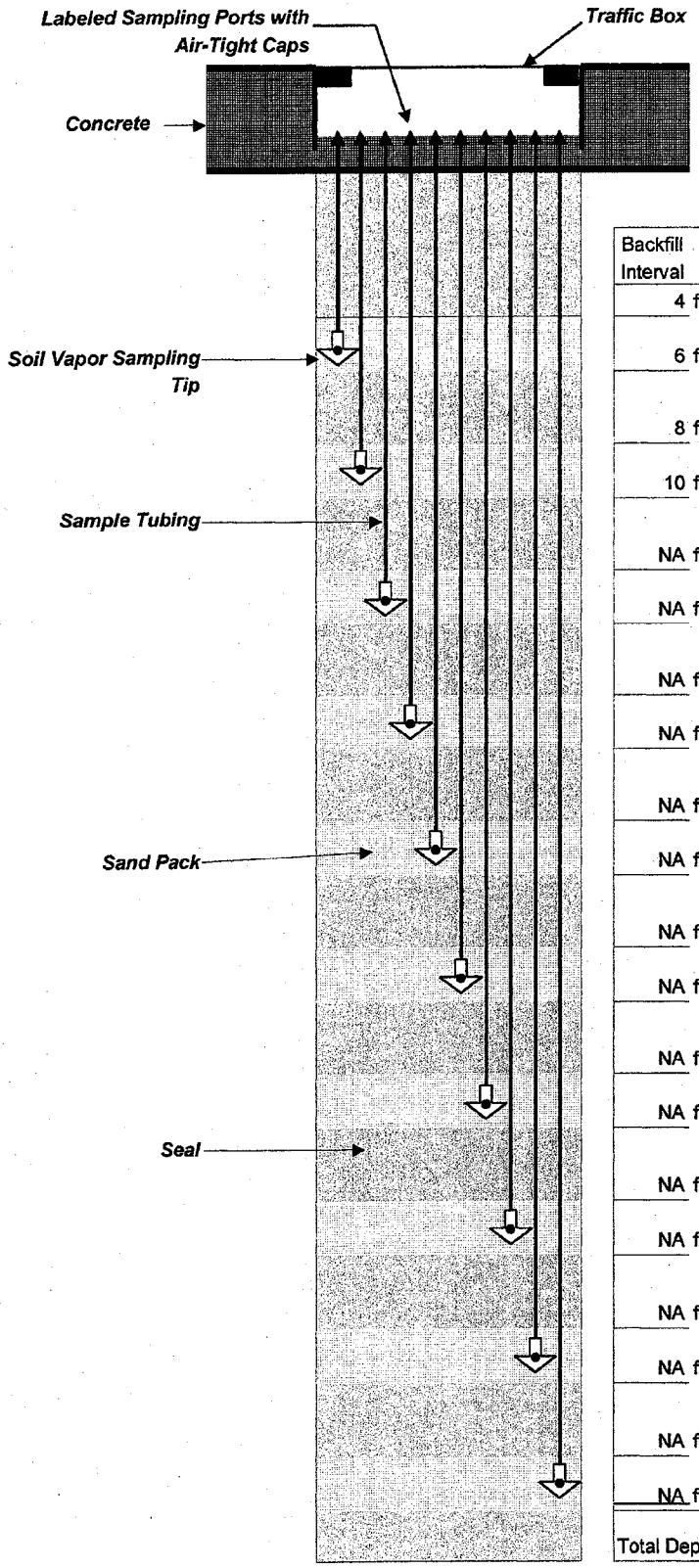
COMMENTS:

SOIL VAPOR WELL CONSTRUCTION LOG

SOIL VAPOR WELL NUMBER: 5

WELL TYPE: Soil Vapor Monitoring Well

SURFACE ELEVATION (feet above MSL): 1126.8



Backfill Interval	Sampling Depth
4 ft.	
6 ft.	5 ft.
8 ft.	
10 ft.	9 ft.
NA ft.	
NA ft.	NA ft.
NA ft.	
NA ft.	NA ft.
NA ft.	
NA ft.	NA ft.
NA ft.	
NA ft.	NA ft.
NA ft.	
NA ft.	NA ft.
NA ft.	
NA ft.	NA ft.
NA ft.	
NA ft.	NA ft.
Total Dept	12 ft.

DRILLING SUMMARY

DATE COMPLETED: 9/3/94

DRILLING COMPANY: Beylik Drilling

DRILLING RIG TYPE: Percussion Hammer

TOTAL DEPTH DRILLED: 12 feet

CONSTRUCTION DETAILS

BOREHOLE DIAMETER: 10 inches

TOTAL NO. OFSAMPLING PORTS: 2

SAND PACK: RMC Lonestar #3

SEAL MATERIAL: Enviroplug No. 16

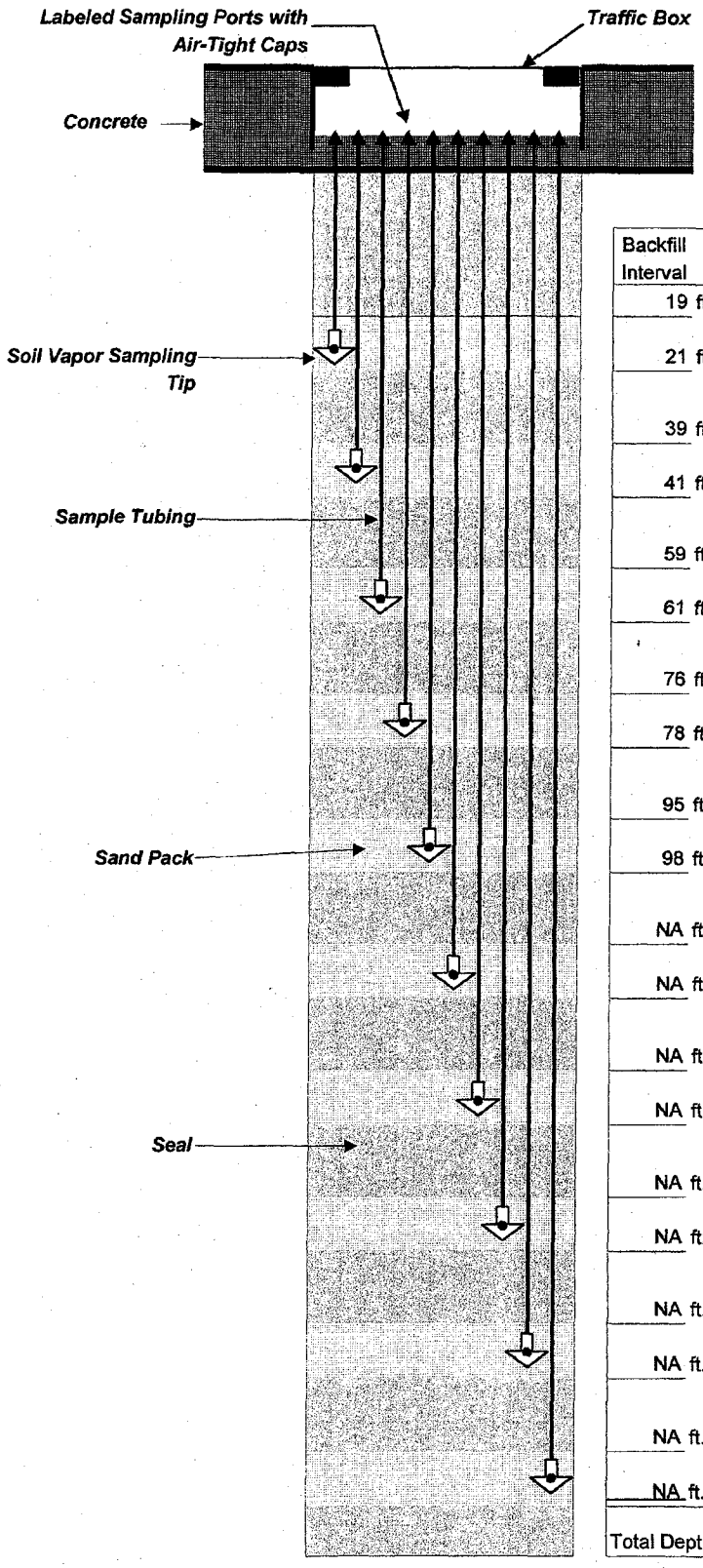
COMMENTS:

SOIL VAPOR WELL CONSTRUCTION LOG

SOIL VAPOR WELL NUMBER: 6

WELL TYPE: Soil Vapor Monitoring Well

SURFACE ELEVATION (feet above MSL): 1137.5



Backfill Interval	Sampling Depth
19 ft.	
21 ft.	20 ft.
39 ft.	
41 ft.	40 ft.
59 ft.	
61 ft.	60 ft.
76 ft.	
78 ft.	77 ft.
95 ft.	
98 ft.	96 ft.
NA ft.	
NA ft.	NA ft.
NA ft.	
NA ft.	NA ft.
NA ft.	
NA ft.	NA ft.
NA ft.	
NA ft.	NA ft.
NA ft.	
NA ft.	NA ft.
Total Dept	100.5 ft.

DRILLING SUMMARY

DATE COMPLETED: 9/5/94

DRILLING COMPANY: Beylik Drilling

DRILLING RIG TYPE: Percussion Hammer

TOTAL DEPTH DRILLED: 100.5 feet

CONSTRUCTION DETAILS

BOREHOLE DIAMETER: 10 inches

TOTAL NO. OFSAMPLING PORTS: 5

SAND PACK: RMC Lonestar #3

SEAL MATERIAL: Enviroplug No. 16

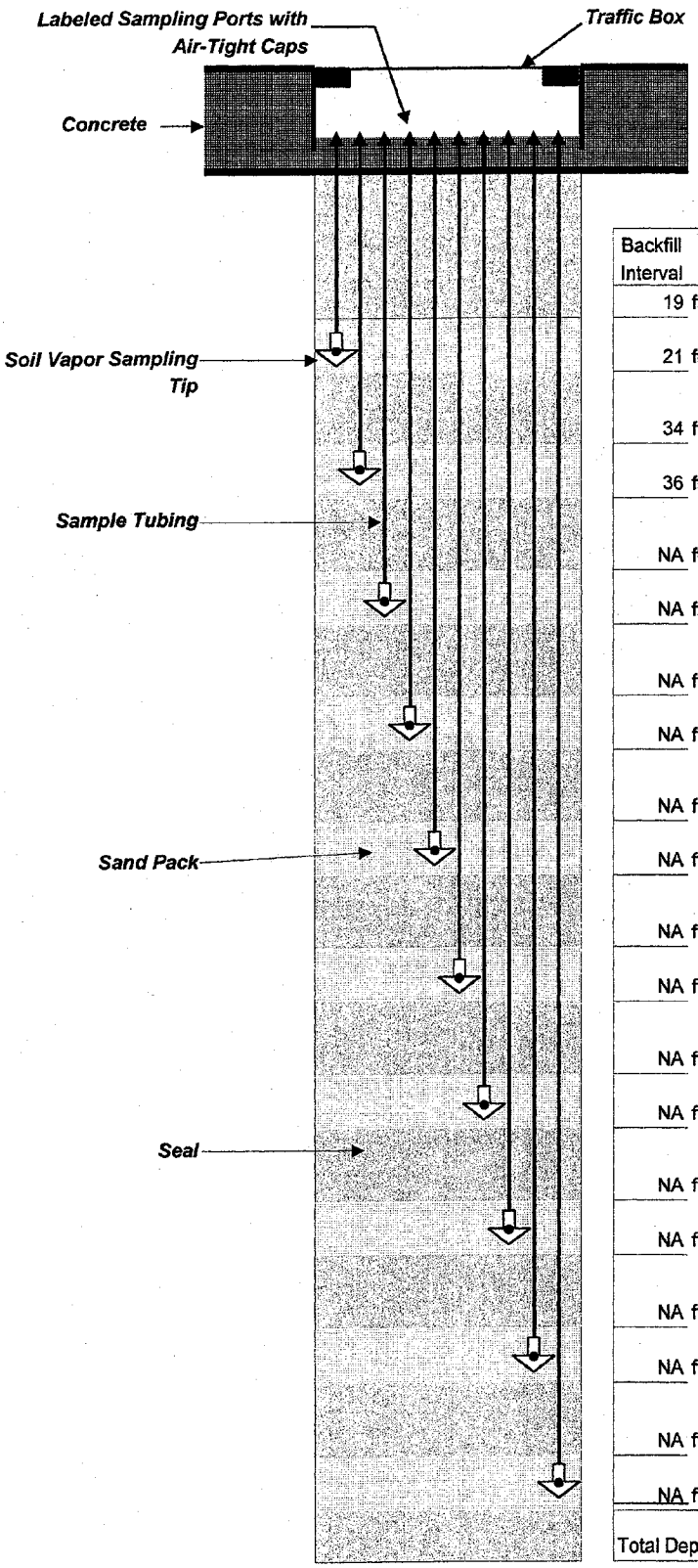
COMMENTS:

SOIL VAPOR WELL CONSTRUCTION LOG

SOIL VAPOR WELL NUMBER: 7

WELL TYPE: Soil Vapor Monitoring Well

SURFACE ELEVATION (feet above MSL): 1115.8



Backfill Interval	Sampling Depth
19 ft.	
21 ft.	20 ft.
34 ft.	
36 ft.	35 ft.
NA ft.	
NA ft.	NA ft.
NA ft.	
NA ft.	NA ft.
NA ft.	
NA ft.	NA ft.
NA ft.	
NA ft.	NA ft.
NA ft.	
NA ft.	NA ft.
NA ft.	
NA ft.	NA ft.
NA ft.	
NA ft.	NA ft.
Total Depth	60.5 ft.

DRILLING SUMMARY

DATE COMPLETED: 9/8/94

DRILLING COMPANY: Beylik Drilling

DRILLING RIG TYPE: Percussion Hammer

TOTAL DEPTH DRILLED: 60.5 feet

CONSTRUCTION DETAILS

BOREHOLE DIAMETER: 10 inches

TOTAL NO. OFSAMPLING PORTS: 2

SAND PACK: RMC Lonestar #3

SEAL MATERIAL: Enviroplug No. 16

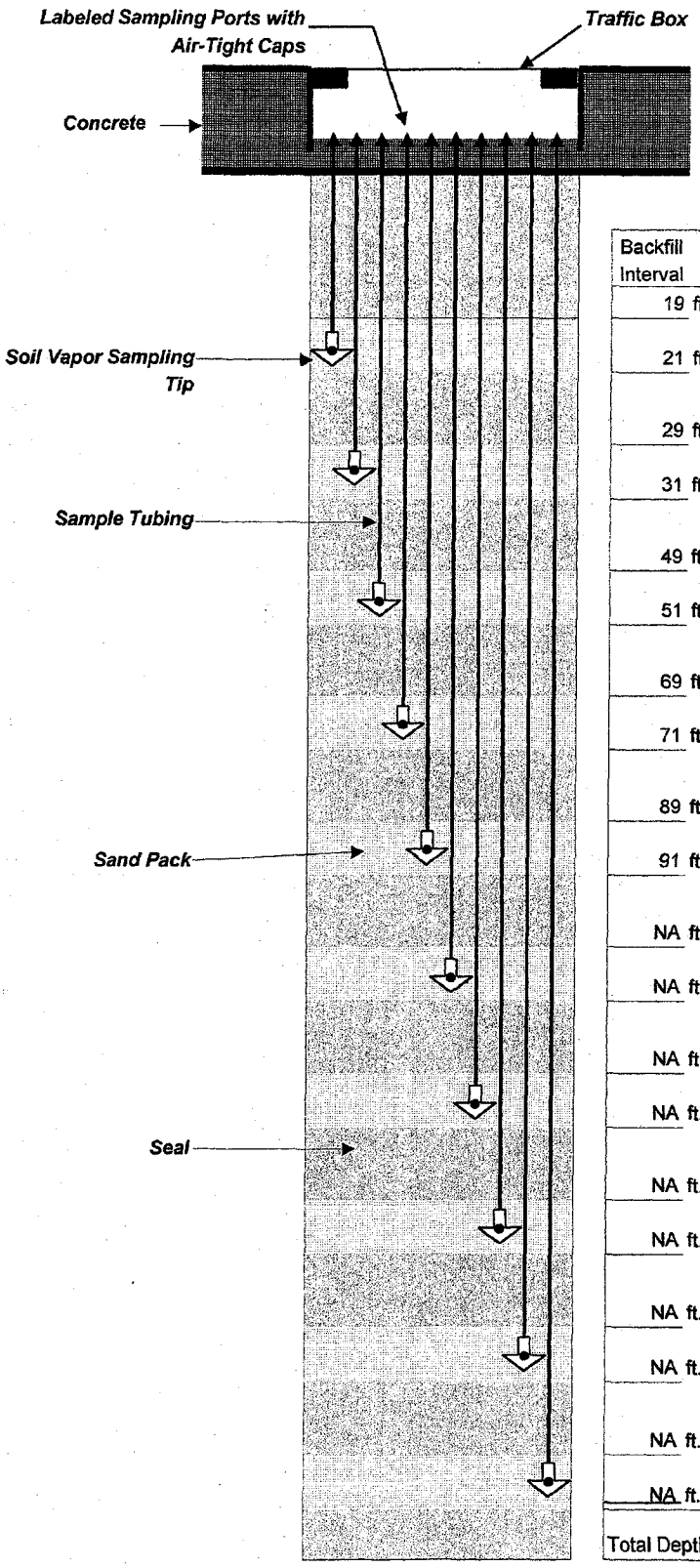
COMMENTS:

SOIL VAPOR WELL CONSTRUCTION LOG

SOIL VAPOR WELL NUMBER: 8

WELL TYPE: Soil Vapor Monitoring Well

SURFACE ELEVATION (feet above MSL): 1256.6



Backfill Interval	Sampling Depth
19 ft.	
21 ft.	20 ft.
29 ft.	
31 ft.	30 ft.
49 ft.	
51 ft.	50 ft.
69 ft.	
71 ft.	70 ft.
89 ft.	
91 ft.	90 ft.
NA ft.	
NA ft.	NA ft.
NA ft.	
NA ft.	NA ft.
NA ft.	
NA ft.	NA ft.
NA ft.	
NA ft.	NA ft.
NA ft.	
NA ft.	NA ft.
Total Depth	101.5 ft.

DRILLING SUMMARY

DATE COMPLETED: 9/9/94

DRILLING COMPANY: Beylik Drilling

DRILLING RIG TYPE: Percussion Hammer

TOTAL DEPTH DRILLED: 101.5 feet

CONSTRUCTION DETAILS

BOREHOLE DIAMETER: 10 inches

TOTAL NO. OFSAMPLING PORTS: 5

SAND PACK: RMC Lonestar #3

SEAL MATERIAL: Enviroplug No. 16

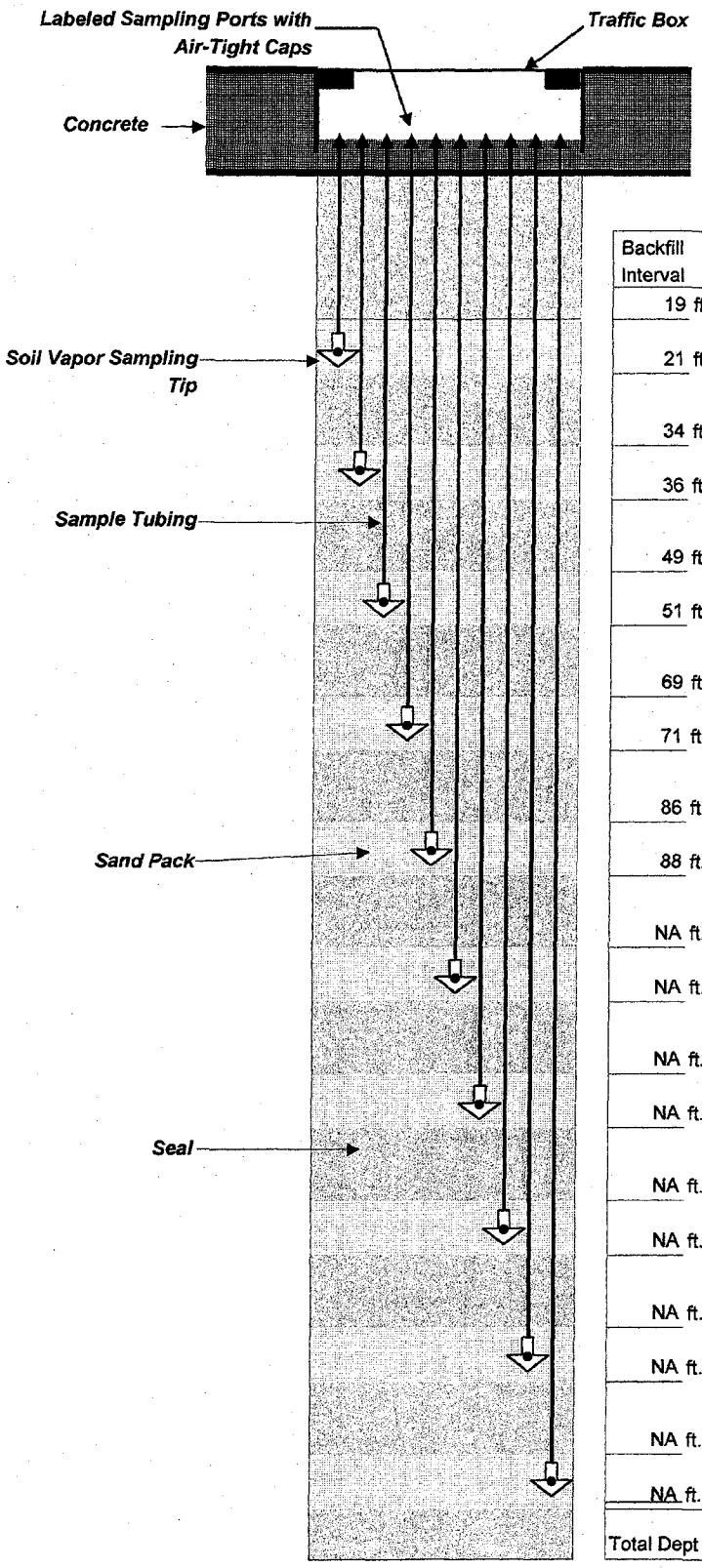
COMMENTS:

SOIL VAPOR WELL CONSTRUCTION LOG

SOIL VAPOR WELL NUMBER: 9

WELL TYPE: Soil Vapor Monitoring Well

SURFACE ELEVATION (feet above MSL): 1230.8



Backfill Interval	Sampling Depth
19 ft.	
21 ft.	20 ft.
34 ft.	
36 ft.	35 ft.
49 ft.	
51 ft.	50 ft.
69 ft.	
71 ft.	70 ft.
86 ft.	
88 ft.	87 ft.
NA ft.	
NA ft.	NA ft.
NA ft.	
NA ft.	NA ft.
NA ft.	
NA ft.	NA ft.
NA ft.	
NA ft.	NA ft.
NA ft.	
NA ft.	NA ft.
Total Dept	90 ft.

DRILLING SUMMARY

DATE COMPLETED: 9/11/94

DRILLING COMPANY: Beylik Drilling

DRILLING RIG TYPE: Percussion Hammer

TOTAL DEPTH DRILLED: 90 feet

CONSTRUCTION DETAILS

BOREHOLE DIAMETER: 10 inches

TOTAL NO. OFSAMPLING PORTS: 5

SAND PACK: RMC Lonestar #3

SEAL MATERIAL: Enviroplug No. 16

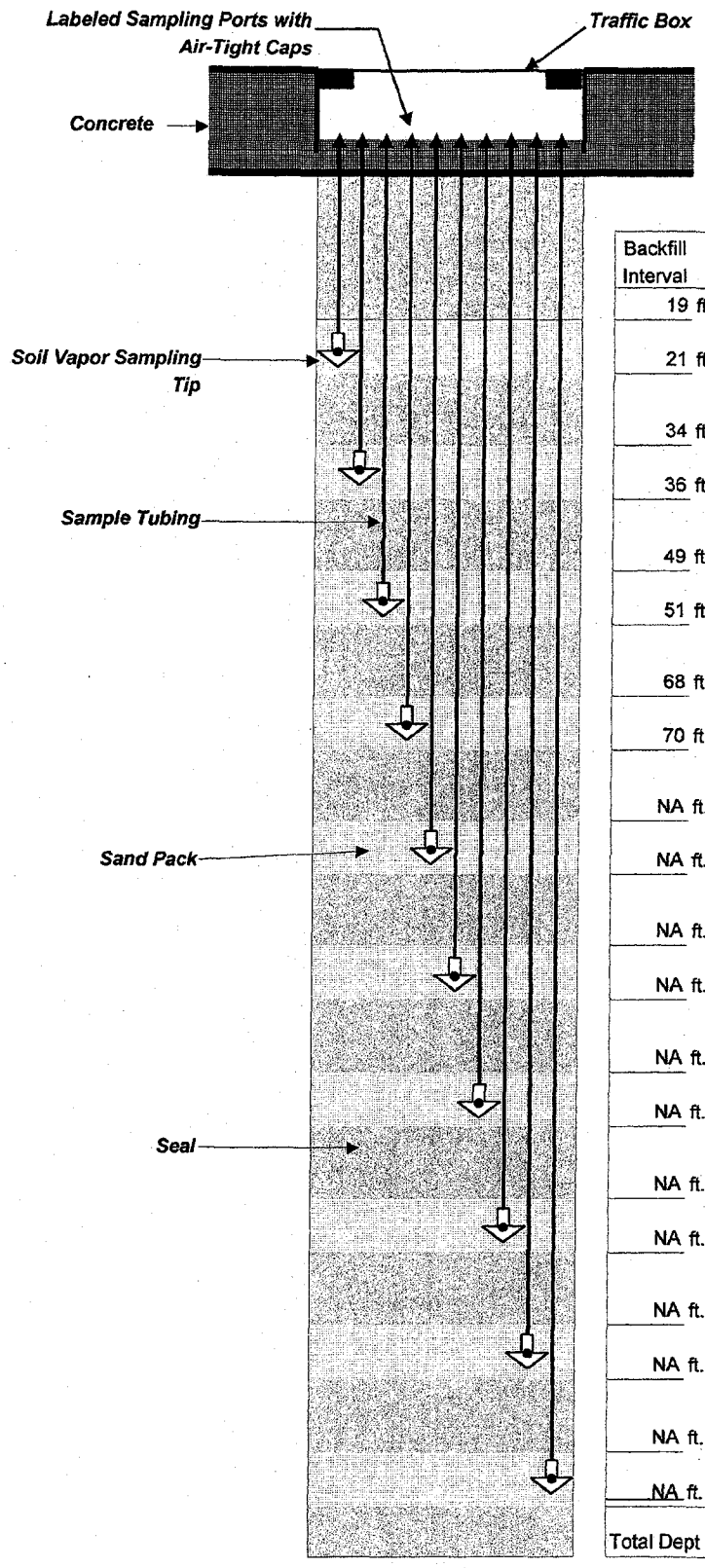
COMMENTS:

SOIL VAPOR WELL CONSTRUCTION LOG

SOIL VAPOR WELL NUMBER: 10

WELL TYPE: Soil Vapor Monitoring Well

SURFACE ELEVATION (feet above MSL): 1232.8



Backfill Interval	Sampling Depth
19 ft.	
21 ft.	20 ft.
34 ft.	
36 ft.	35 ft.
49 ft.	
51 ft.	50 ft.
68 ft.	
70 ft.	69 ft.
NA ft.	
NA ft.	NA ft.
NA ft.	
NA ft.	NA ft.
NA ft.	
NA ft.	NA ft.
NA ft.	
NA ft.	NA ft.
NA ft.	
NA ft.	NA ft.
Total Dept	72 ft.

DRILLING SUMMARY

DATE COMPLETED: 9/13/94

DRILLING COMPANY: Beylik Drilling

DRILLING RIG TYPE: Percussion Hammer

TOTAL DEPTH DRILLED: 72 feet

CONSTRUCTION DETAILS

BOREHOLE DIAMETER: 10 inches

TOTAL NO. OFSAMPLING PORTS: 4

SAND PACK: RMC Lonestar #3

SEAL MATERIAL: Enviroplug No. 16

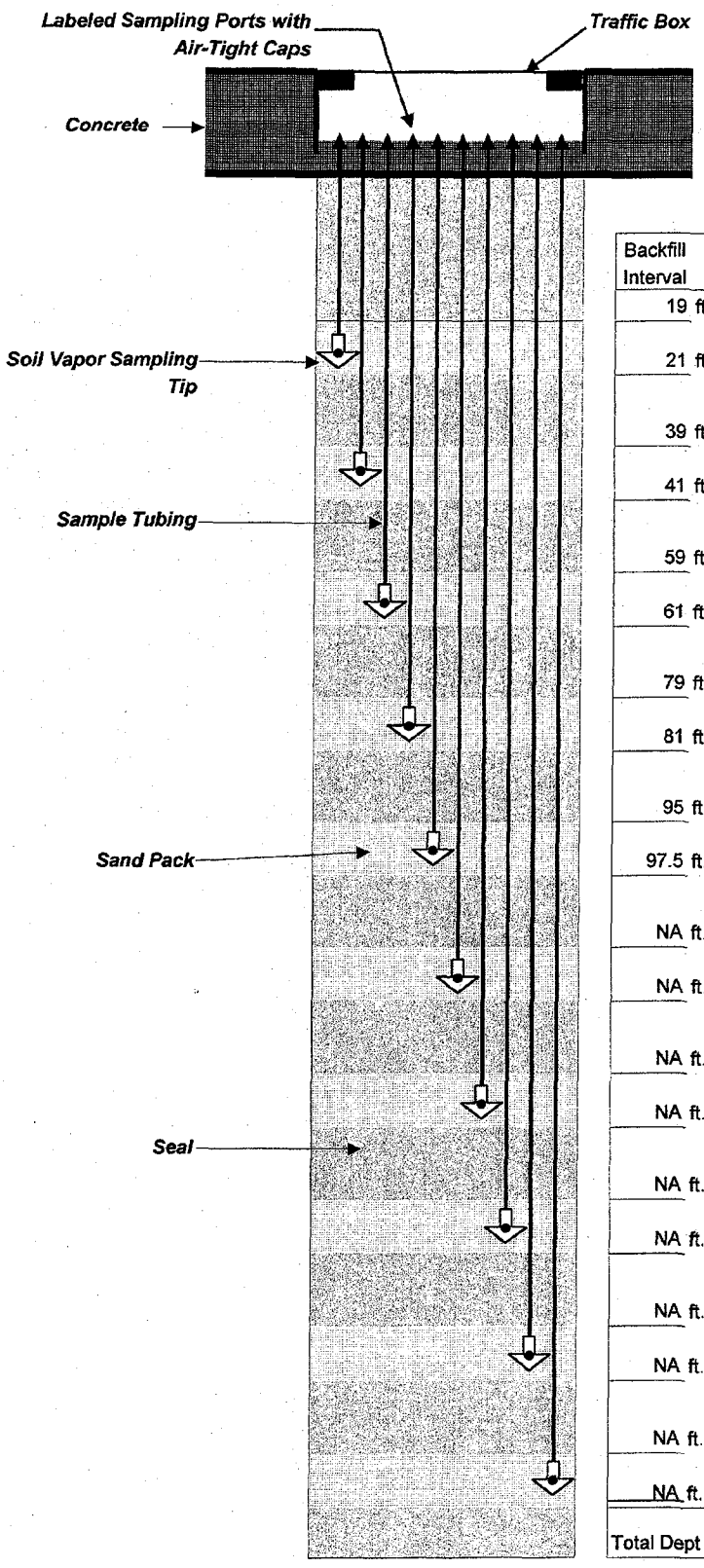
COMMENTS:

SOIL VAPOR WELL CONSTRUCTION LOG

SOIL VAPOR WELL NUMBER: 11

WELL TYPE: Soil Vapor Monitoring Well

SURFACE ELEVATION (feet above MSL): 1193.1



Backfill Interval	Sampling Depth
19 ft.	
21 ft.	20 ft.
39 ft.	
41 ft.	40 ft.
59 ft.	
61 ft.	60 ft.
79 ft.	
81 ft.	80 ft.
95 ft.	
97.5 ft.	96 ft.
NA ft.	
NA ft.	NA ft.
NA ft.	
NA ft.	NA ft.
NA ft.	
NA ft.	NA ft.
NA ft.	
NA ft.	NA ft.
NA ft.	
NA ft.	NA ft.
Total Dept	100 ft.

DRILLING SUMMARY

DATE COMPLETED: 9/18/94

DRILLING COMPANY: Beylik Drilling

DRILLING RIG TYPE: Percussion Hammer

TOTAL DEPTH DRILLED: 100 feet

CONSTRUCTION DETAILS

BOREHOLE DIAMETER: 10 inches

TOTAL NO. OFSAMPLING PORTS: 5

SAND PACK: RMC Lonestar #3

SEAL MATERIAL: Enviroplug No. 16

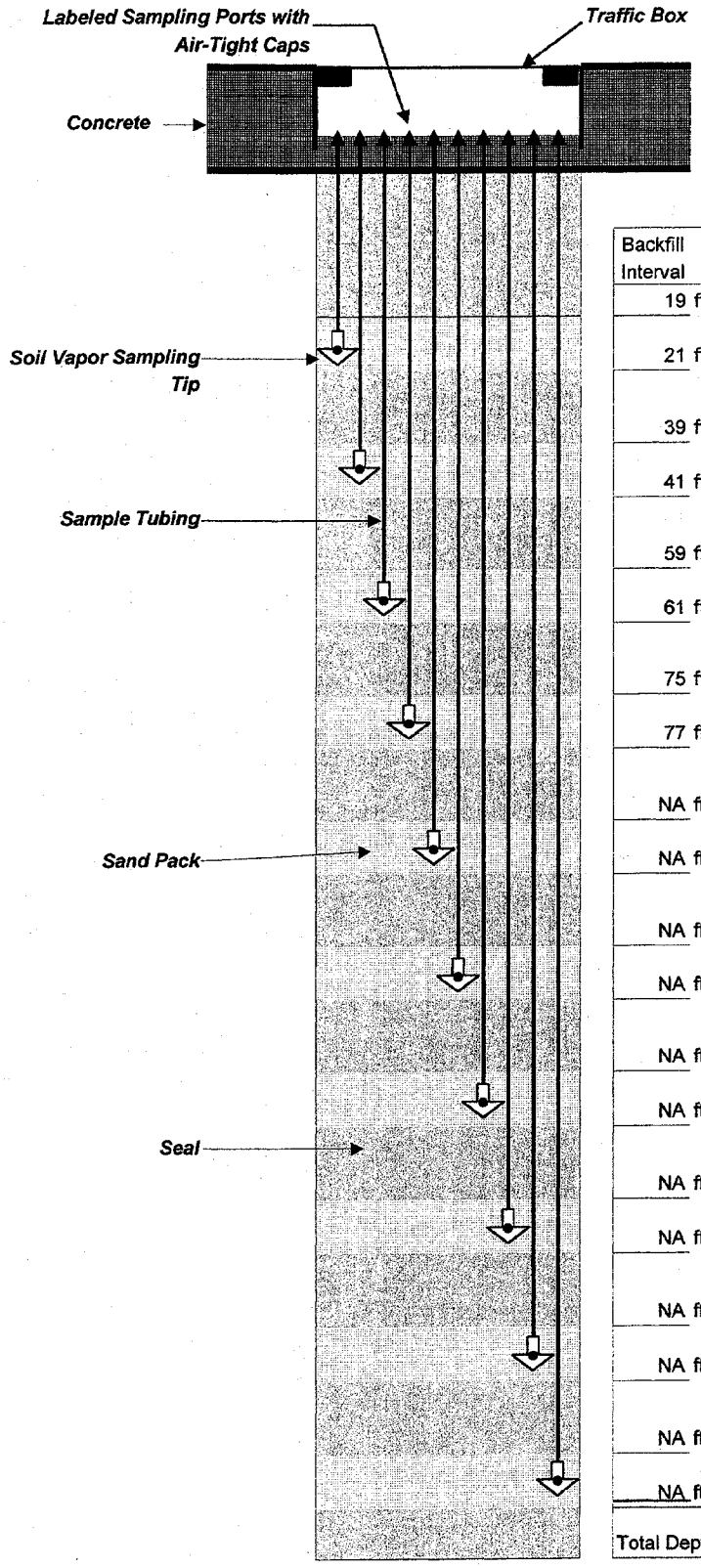
COMMENTS:

SOIL VAPOR WELL CONSTRUCTION LOG

SOIL VAPOR WELL NUMBER: 12

WELL TYPE: Soil Vapor Monitoring Well

SURFACE ELEVATION (feet above MSL): 1097.9



Backfill Interval	Sampling Depth
19 ft.	
21 ft.	20 ft.
39 ft.	
41 ft.	40 ft.
59 ft.	
61 ft.	60 ft.
75 ft.	
77 ft.	76 ft.
NA ft.	
NA ft.	NA ft.
NA ft.	
NA ft.	NA ft.
NA ft.	
NA ft.	NA ft.
NA ft.	
NA ft.	NA ft.
NA ft.	
NA ft.	NA ft.
NA ft.	
NA ft.	NA ft.
Total Dept	81 ft.

DRILLING SUMMARY

DATE COMPLETED: 9/19/94

DRILLING COMPANY: Beylik Drilling

DRILLING RIG TYPE: Percussion Hammer

TOTAL DEPTH DRILLED: 81 feet

CONSTRUCTION DETAILS

BOREHOLE DIAMETER: 10 inches

TOTAL NO. OFSAMPLING PORTS: 4

SAND PACK: RMC Lonestar #3

SEAL MATERIAL: Enviroplug No. 16

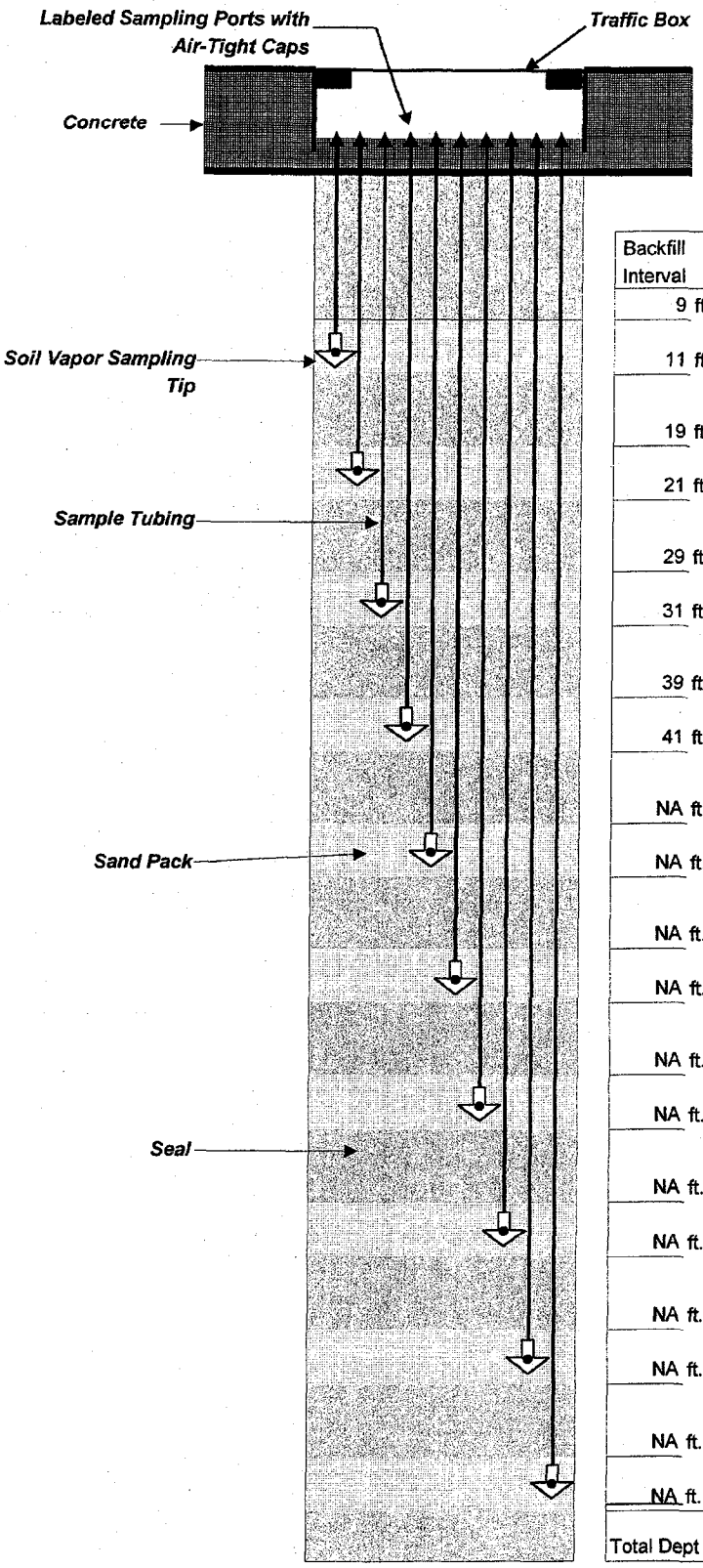
COMMENTS:

SOIL VAPOR WELL CONSTRUCTION LOG

SOIL VAPOR WELL NUMBER: 13

WELL TYPE: Soil Vapor Monitoring Well

SURFACE ELEVATION (feet above MSL): 1239.2



Backfill Interval	Sampling Depth
9 ft.	
11 ft.	10 ft.
19 ft.	
21 ft.	20 ft.
29 ft.	
31 ft.	30 ft.
39 ft.	
41 ft.	40 ft.
NA ft.	
NA ft.	NA ft.
NA ft.	
NA ft.	NA ft.
NA ft.	
NA ft.	NA ft.
NA ft.	
NA ft.	NA ft.
NA ft.	
NA ft.	NA ft.
NA ft.	
NA ft.	NA ft.
Total Dept	48 ft.

DRILLING SUMMARY

DATE COMPLETED: 9/21/94

DRILLING COMPANY: Beylik Drilling

DRILLING RIG TYPE: Percussion Hammer

TOTAL DEPTH DRILLED: 48 feet

CONSTRUCTION DETAILS

BOREHOLE DIAMETER: 10 inches

TOTAL NO. OFSAMPLING PORTS: 4

SAND PACK: RMC Lonestar #3

SEAL MATERIAL: Enviroplug No. 16

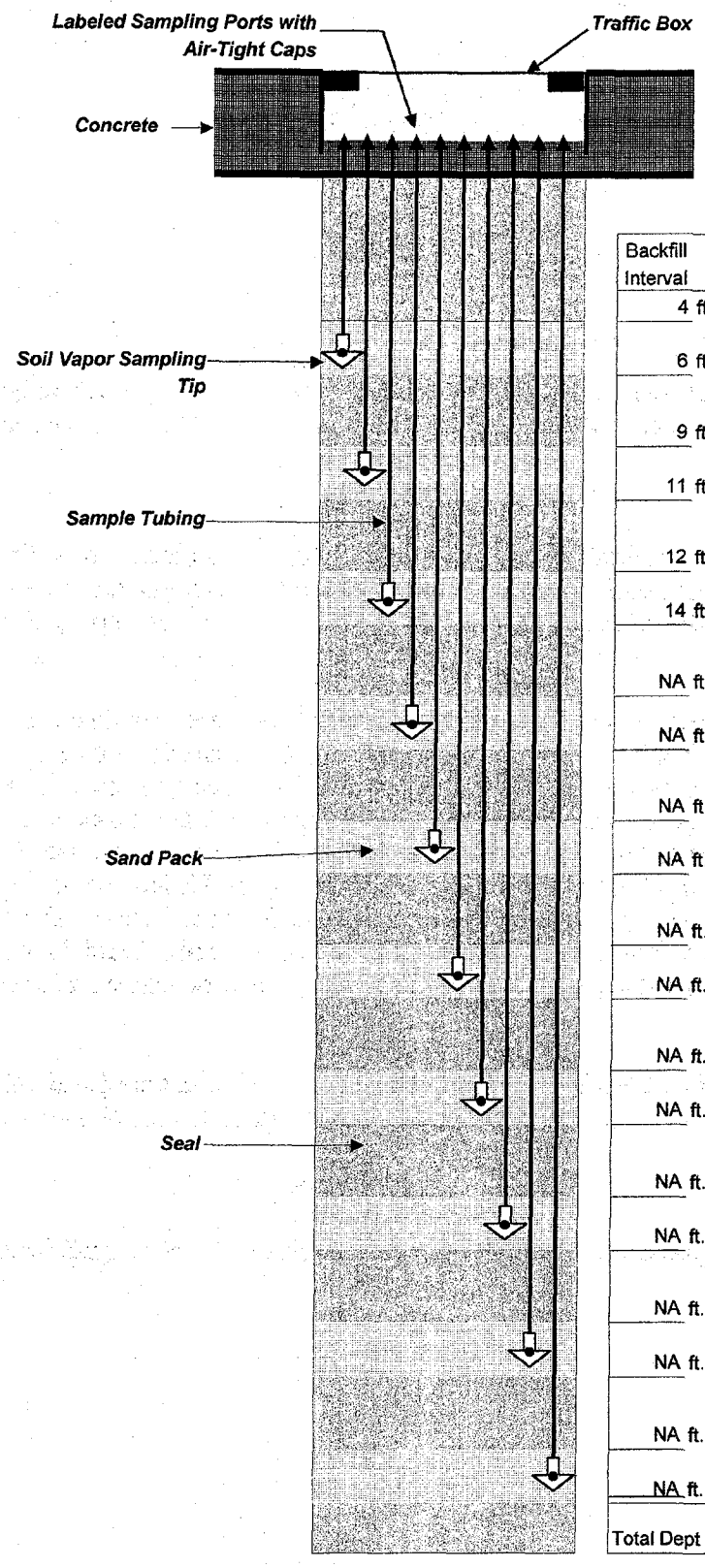
COMMENTS:

SOIL VAPOR WELL CONSTRUCTION LOG

SOIL VAPOR WELL NUMBER: 14

WELL TYPE: Soil Vapor Monitoring Well

SURFACE ELEVATION (feet above MSL): 1213.0



Backfill Interval	Sampling Depth
4 ft.	
6 ft.	5 ft.
9 ft.	
11 ft.	10 ft.
12 ft.	
14 ft.	13 ft.
NA ft.	
NA ft.	NA ft.
NA ft.	
NA ft.	NA ft.
NA ft.	
NA ft.	NA ft.
NA ft.	
NA ft.	NA ft.
NA ft.	
NA ft.	NA ft.
NA ft.	
NA ft.	NA ft.
NA ft.	
NA ft.	NA ft.
Total Dept	18 ft.

DRILLING SUMMARY

DATE COMPLETED: 9/22/94

DRILLING COMPANY: Beylik Drilling

DRILLING RIG TYPE: Percussion Hammer

TOTAL DEPTH DRILLED: 18 feet

CONSTRUCTION DETAILS

BOREHOLE DIAMETER: 10 inches

TOTAL NO. OFSAMPLING PORTS: 3

SAND PACK: RMC Lonestar #3

SEAL MATERIAL: Enviroplug No. 16

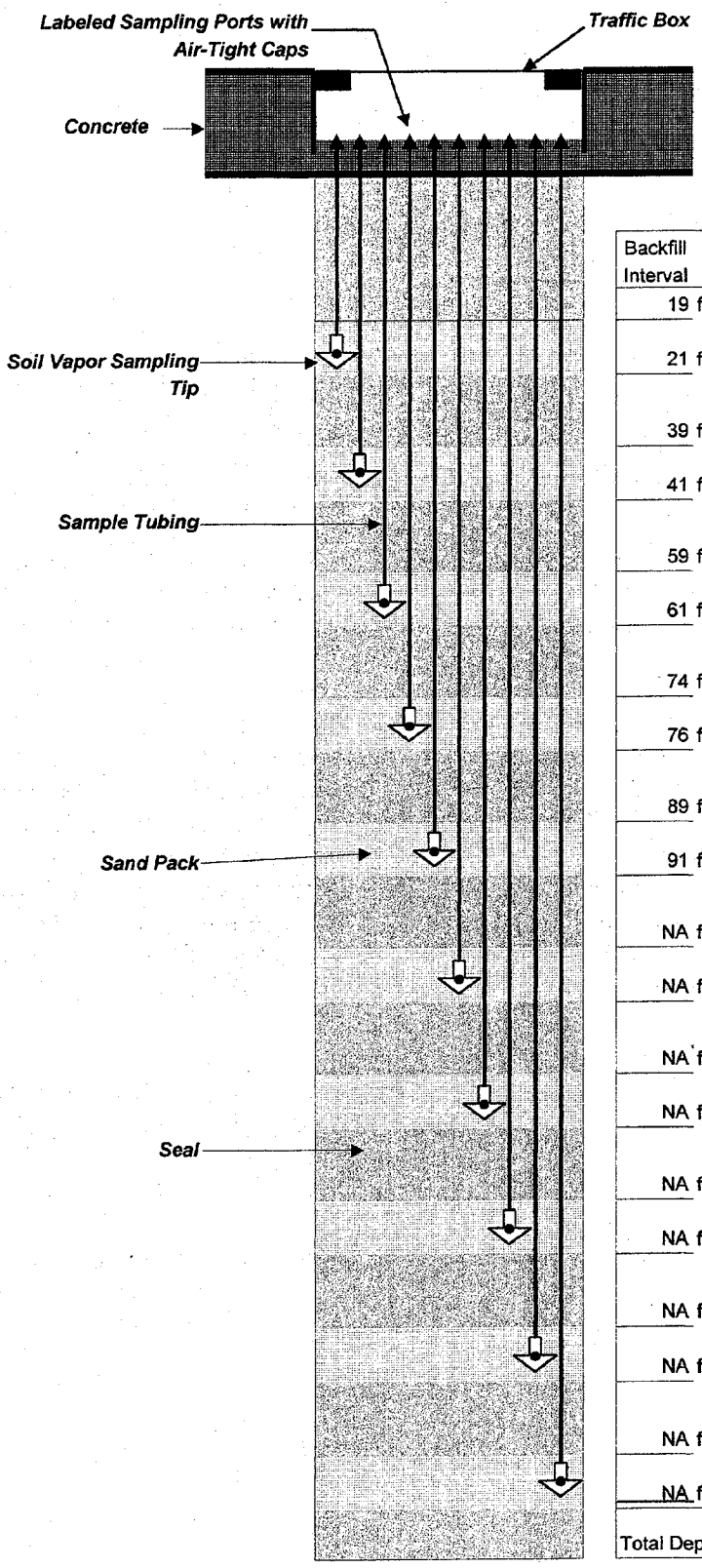
COMMENTS:

SOIL VAPOR WELL CONSTRUCTION LOG

SOIL VAPOR WELL NUMBER: 15

WELL TYPE: Soil Vapor Monitoring Well

SURFACE ELEVATION (feet above MSL): 1123.5



Backfill Interval	Sampling Depth
19 ft.	
21 ft.	20 ft.
39 ft.	
41 ft.	40 ft.
59 ft.	
61 ft.	60 ft.
74 ft.	
76 ft.	75 ft.
89 ft.	
91 ft.	90 ft.
NA ft.	
NA ft.	NA ft.
NA ft.	
NA ft.	NA ft.
NA ft.	
NA ft.	NA ft.
NA ft.	
NA ft.	NA ft.
NA ft.	
NA ft.	NA ft.
Total Dept	95 ft.

DRILLING SUMMARY

DATE COMPLETED: 9/24/94

DRILLING COMPANY: Beylik Drilling

DRILLING RIG TYPE: Percussion Hammer

TOTAL DEPTH DRILLED: 95 feet

CONSTRUCTION DETAILS

BOREHOLE DIAMETER: 10 inches

TOTAL NO. OFSAMPLING PORTS: 5

SAND PACK: RMC Lonestar #3

SEAL MATERIAL: Enviroplug No. 16

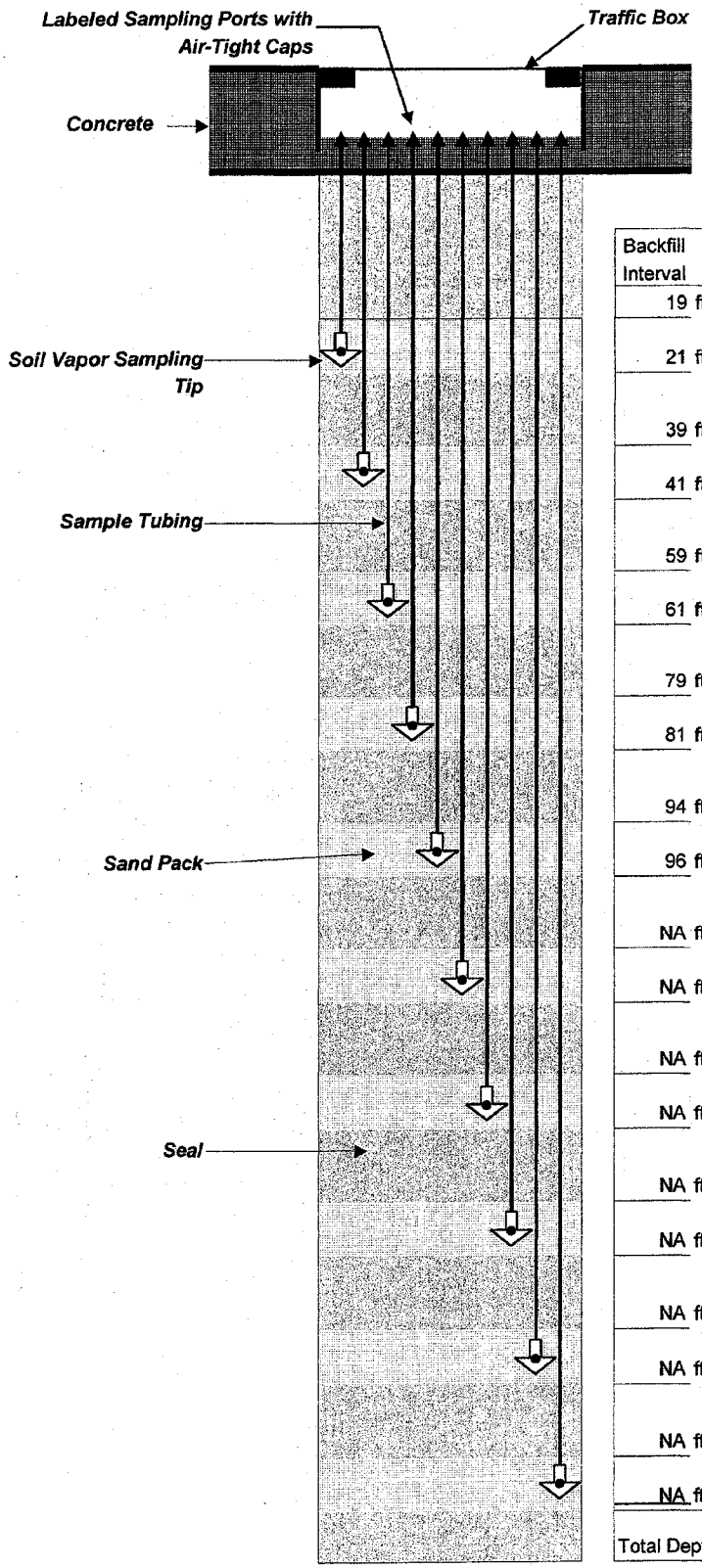
COMMENTS:

SOIL VAPOR WELL CONSTRUCTION LOG

SOIL VAPOR WELL NUMBER: 16

WELL TYPE: Soil Vapor Monitoring Well

SURFACE ELEVATION (feet above MSL): 1199.2



Backfill Interval	Sampling Depth
19 ft.	
21 ft.	20 ft.
39 ft.	
41 ft.	40 ft.
59 ft.	
61 ft.	60 ft.
79 ft.	
81 ft.	80 ft.
94 ft.	
96 ft.	95 ft.
NA ft.	
NA ft.	NA ft.
NA ft.	
NA ft.	NA ft.
NA ft.	
NA ft.	NA ft.
NA ft.	
NA ft.	NA ft.
NA ft.	
NA ft.	NA ft.
Total Dept	101.5 ft.

DRILLING SUMMARY

DATE COMPLETED: 9/29/94

DRILLING COMPANY: Beylik Drilling

DRILLING RIG TYPE: Percussion Hammer

TOTAL DEPTH DRILLED: 101.5 feet

CONSTRUCTION DETAILS

BOREHOLE DIAMETER: 10 inches

TOTAL NO. OFSAMPLING PORTS: 5

SAND PACK: RMC Lonestar #3

SEAL MATERIAL: Enviroplug No. 16

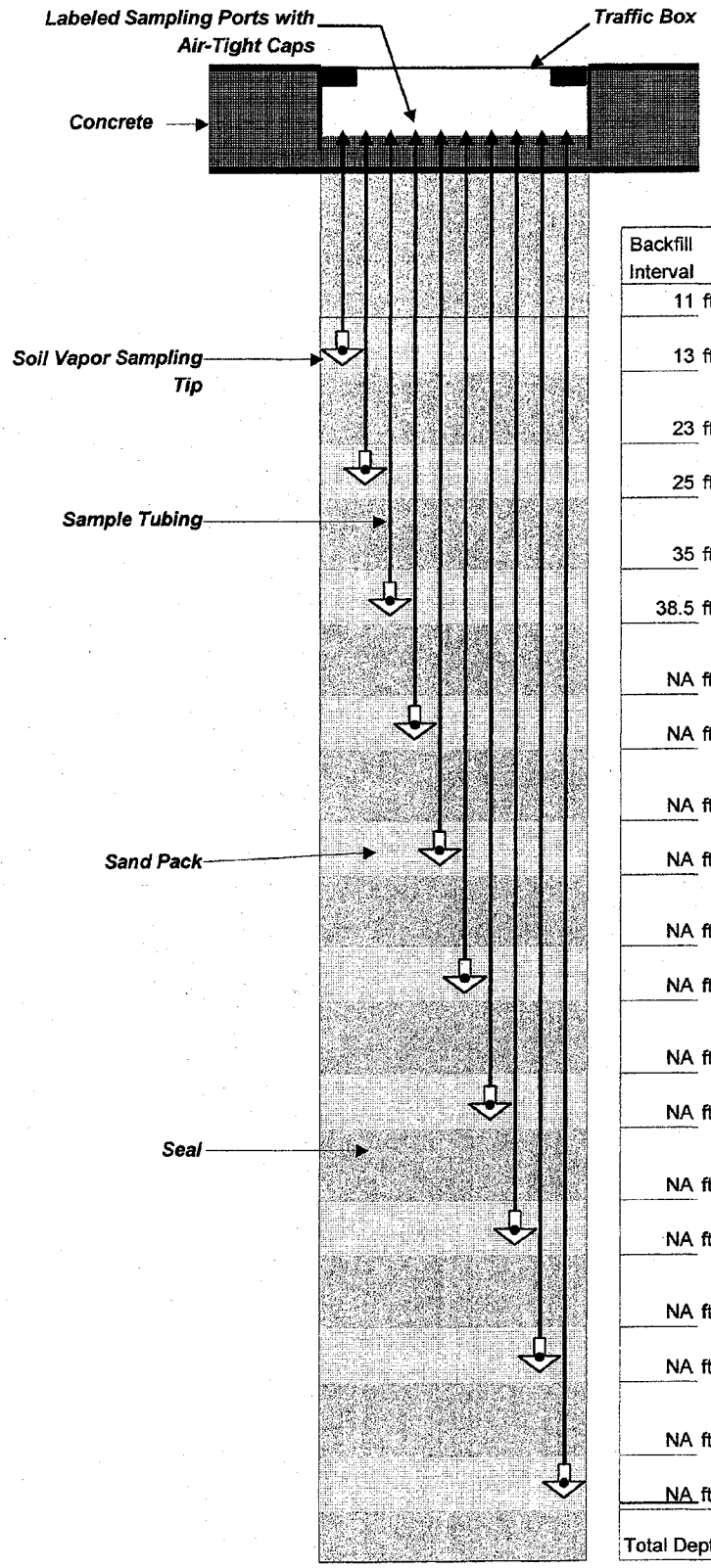
COMMENTS:

SOIL VAPOR WELL CONSTRUCTION LOG

SOIL VAPOR WELL NUMBER: 17

WELL TYPE: Soil Vapor Monitoring Well

SURFACE ELEVATION (feet above MSL): 1214.1



Backfill Interval	Sampling Depth
11 ft.	
13 ft.	12 ft.
23 ft.	
25 ft.	24 ft.
35 ft.	
38.5 ft.	36 ft.
NA ft.	
NA ft.	NA ft.
NA ft.	
NA ft.	NA ft.
NA ft.	
NA ft.	NA ft.
NA ft.	
NA ft.	NA ft.
NA ft.	
NA ft.	NA ft.
NA ft.	
NA ft.	NA ft.
NA ft.	
NA ft.	NA ft.
Total Dept	40 ft.

DRILLING SUMMARY

DATE COMPLETED: 9/30/94

DRILLING COMPANY: Beylik Drilling

DRILLING RIG TYPE: Percussion Hammer

TOTAL DEPTH DRILLED: 40 feet

CONSTRUCTION DETAILS

BOREHOLE DIAMETER: 10 inches

TOTAL NO. OFSAMPLING PORTS: 3

SAND PACK: RMC Lonestar #3

SEAL MATERIAL: Enviroplug No. 16

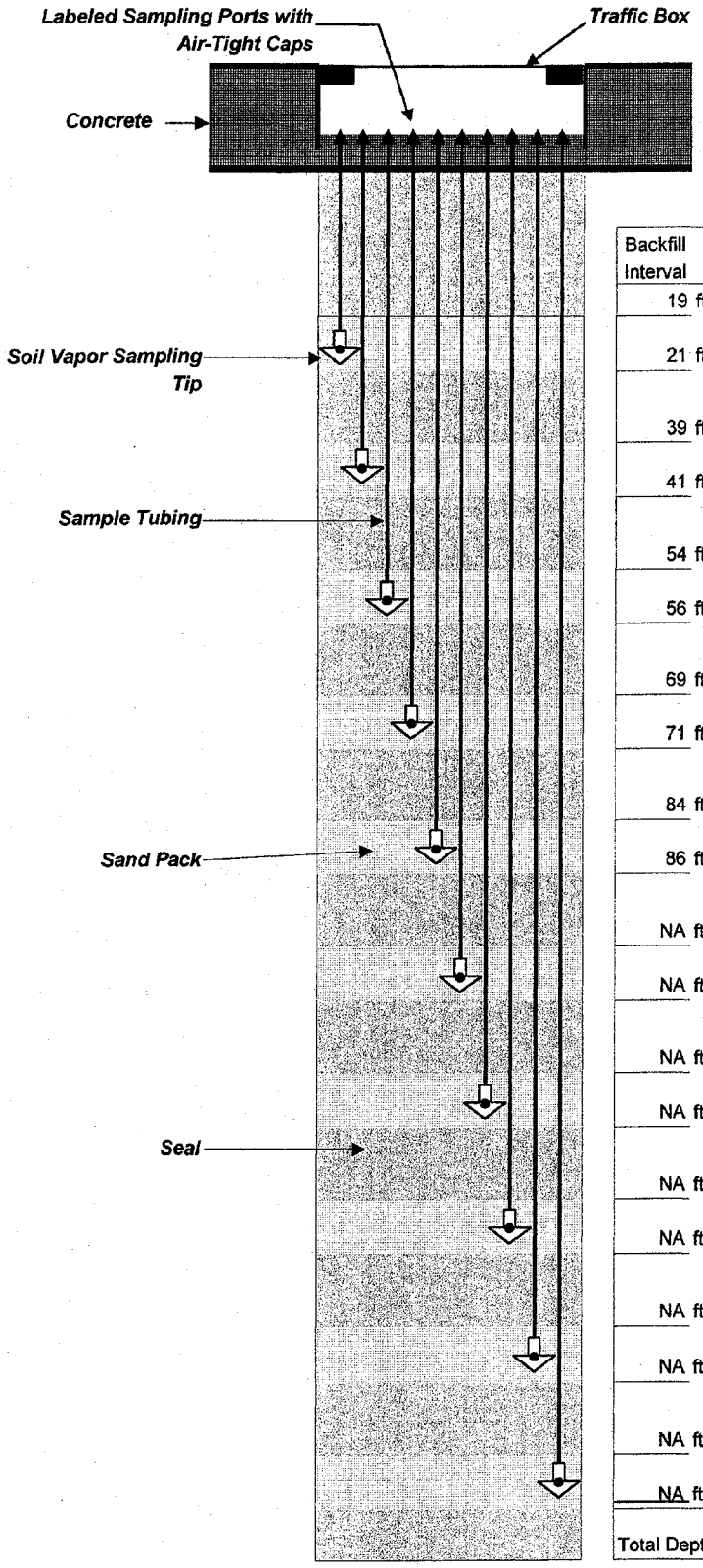
COMMENTS:

SOIL VAPOR WELL CONSTRUCTION LOG

SOIL VAPOR WELL NUMBER: 18

WELL TYPE: Soil Vapor Monitoring Well

SURFACE ELEVATION (feet above MSL): 1109.4



Backfill Interval	Sampling Depth
19 ft.	
21 ft.	20 ft.
39 ft.	
41 ft.	40 ft.
54 ft.	
56 ft.	55 ft.
69 ft.	
71 ft.	70 ft.
84 ft.	
86 ft.	85 ft.
NA ft.	
NA ft.	NA ft.
NA ft.	
NA ft.	NA ft.
NA ft.	
NA ft.	NA ft.
NA ft.	
NA ft.	NA ft.
NA ft.	
NA ft.	NA ft.
Total Dept	89.5 ft.

DRILLING SUMMARY

DATE COMPLETED: 10/2/94

DRILLING COMPANY: Beylik Drilling

DRILLING RIG TYPE: Percussion Hammer

TOTAL DEPTH DRILLED: 89.5 feet

CONSTRUCTION DETAILS

BOREHOLE DIAMETER: 10 inches

TOTAL NO. OFSAMPLING PORTS: 5

SAND PACK: RMC Lonestar #3

SEAL MATERIAL: Enviroplug No. 16

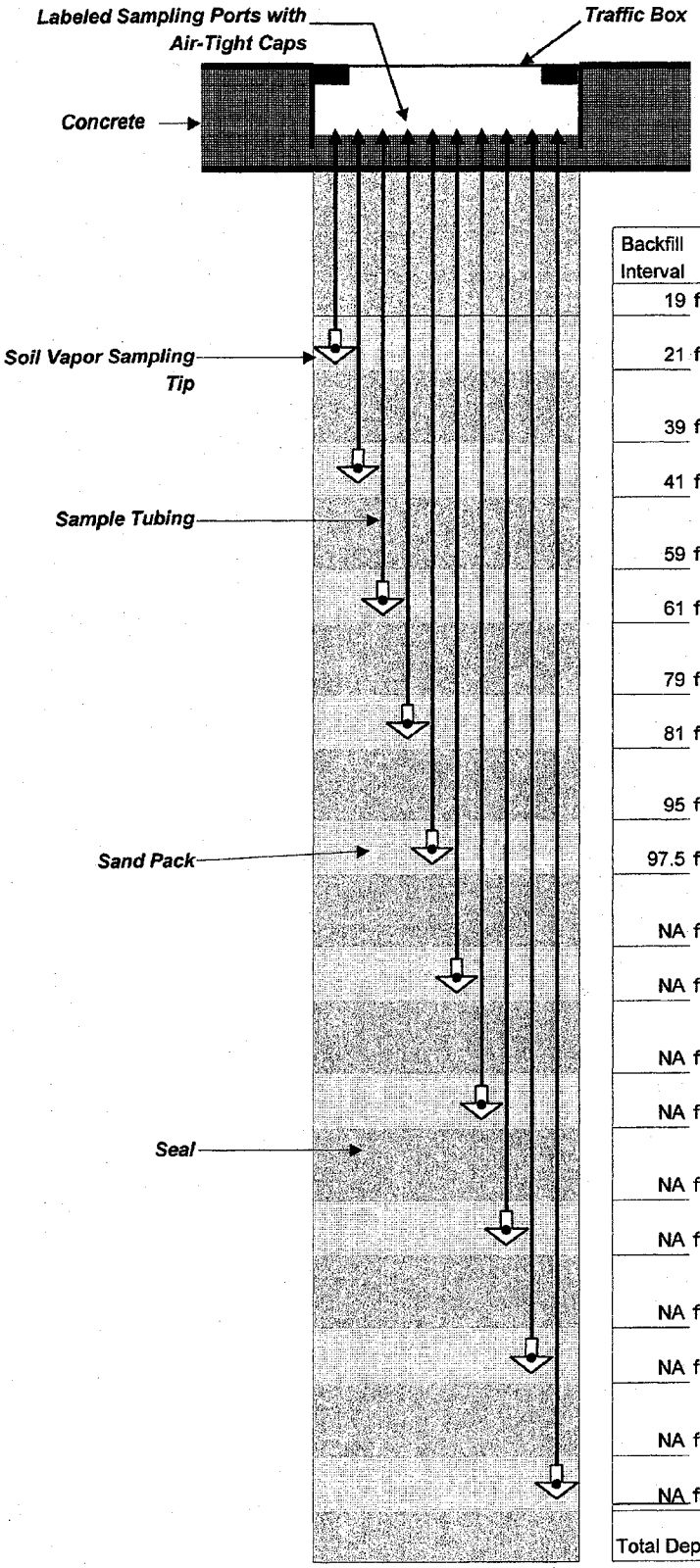
COMMENTS:

SOIL VAPOR WELL CONSTRUCTION LOG

SOIL VAPOR WELL NUMBER: 19A

WELL TYPE: Soil Vapor Monitoring Well

SURFACE ELEVATION (feet above MSL): 1196.4



Backfill Interval	Sampling Depth
19 ft.	
21 ft.	20 ft.
39 ft.	
41 ft.	40 ft.
59 ft.	
61 ft.	60 ft.
79 ft.	
81 ft.	80 ft.
95 ft.	
97.5 ft.	96 ft.
NA ft.	
NA ft.	AN ft.
NA ft.	
NA ft.	NA ft.
NA ft.	
NA ft.	NA ft.
NA ft.	
NA ft.	NA ft.
NA ft.	
NA ft.	NA ft.
Total Dept	101 ft.

DRILLING SUMMARY

DATE COMPLETED: 10/4/94

DRILLING COMPANY: Beylik Drilling

DRILLING RIG TYPE: Percussion Hammer

TOTAL DEPTH DRILLED: 101 feet

CONSTRUCTION DETAILS

BOREHOLE DIAMETER: 10 inches

TOTAL NO. OFSAMPLING PORTS: 5

SAND PACK: RMC Lonestar #3

SEAL MATERIAL: Enviroplug No. 16

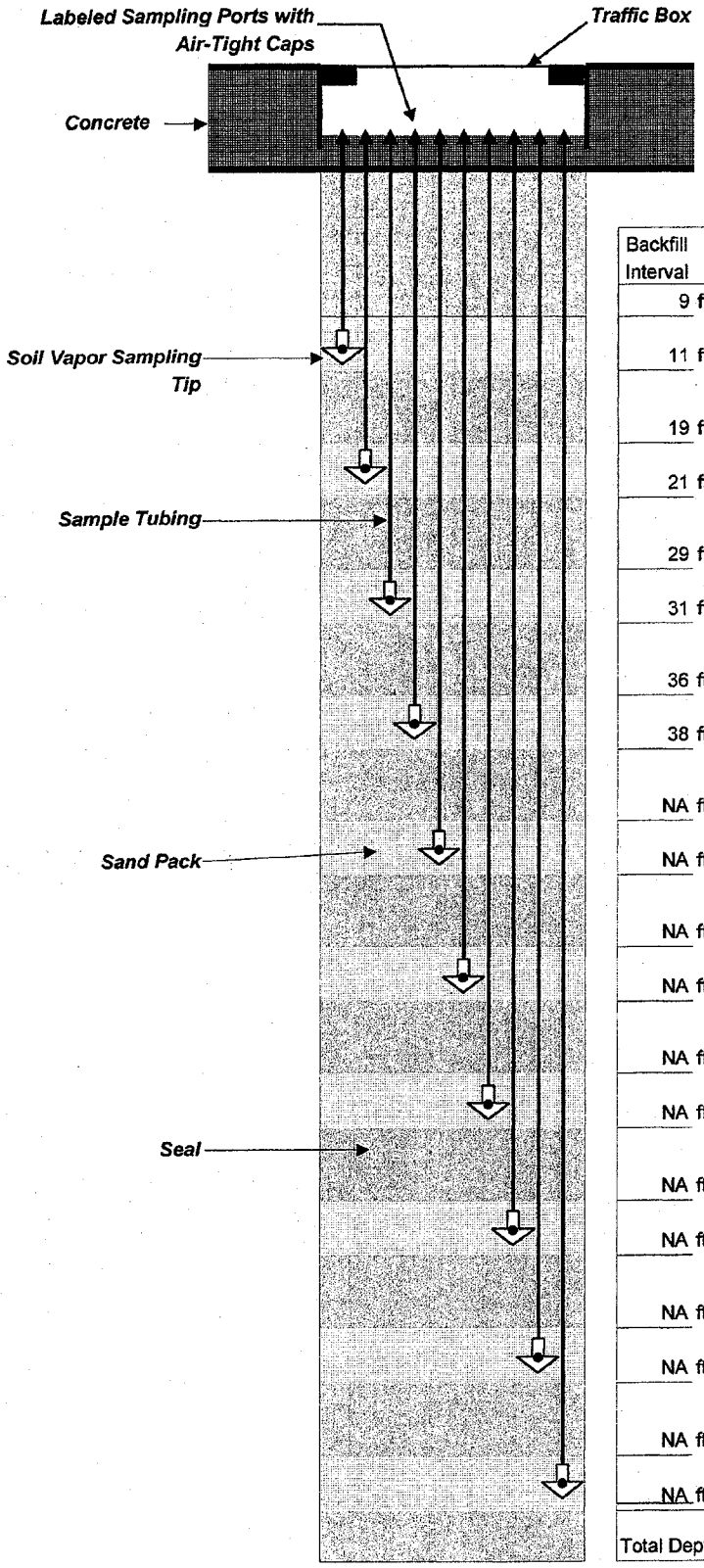
COMMENTS:

SOIL VAPOR WELL CONSTRUCTION LOG

SOIL VAPOR WELL NUMBER: 20

WELL TYPE: Soil Vapor Monitoring Well

SURFACE ELEVATION (feet above MSL): 1142.7



Backfill Interval	Sampling Depth
9 ft.	
11 ft.	10 ft.
19 ft.	
21 ft.	20 ft.
29 ft.	
31 ft.	30 ft.
36 ft.	
38 ft.	37 ft.
NA ft.	
NA ft.	NA ft.
NA ft.	
NA ft.	NA ft.
NA ft.	
NA ft.	NA ft.
NA ft.	
NA ft.	NA ft.
NA ft.	
NA ft.	NA ft.
NA ft.	
NA ft.	NA ft.
Total Dept	41.5 ft.

DRILLING SUMMARY

DATE COMPLETED: 10/13/94

DRILLING COMPANY: Beylik Drilling

DRILLING RIG TYPE: Percussion Hammer

TOTAL DEPTH DRILLED: 41.5 feet

CONSTRUCTION DETAILS

BOREHOLE DIAMETER: 10 inches

TOTAL NO. OFSAMPLING PORTS: 4

SAND PACK: RMC Lonestar #3

SEAL MATERIAL: Enviroplug No. 16

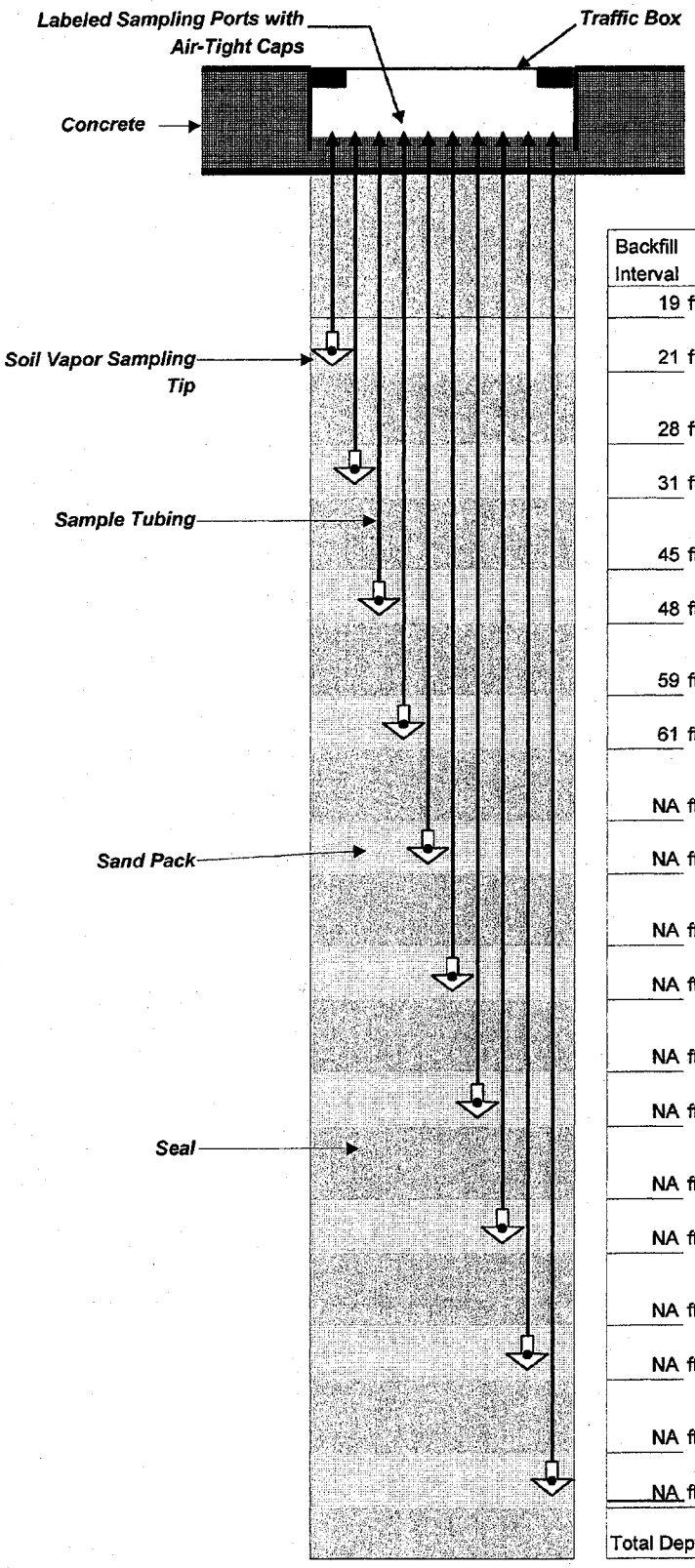
COMMENTS:

SOIL VAPOR WELL CONSTRUCTION LOG

SOIL VAPOR WELL NUMBER: 20A

WELL TYPE: Soil Vapor Monitoring Well

SURFACE ELEVATION (feet above MSL): 1142.7



Backfill Interval	Sampling Depth
19 ft.	
21 ft.	20 ft.
28 ft.	
31 ft.	30 ft.
45 ft.	
48 ft.	47 ft.
59 ft.	
61 ft.	60 ft.
NA ft.	
NA ft.	NA ft.
NA ft.	
NA ft.	NA ft.
NA ft.	
NA ft.	NA ft.
NA ft.	
NA ft.	NA ft.
NA ft.	
NA ft.	NA ft.
NA ft.	
NA ft.	NA ft.
Total Depth	72 ft.

DRILLING SUMMARY

DATE COMPLETED: 10/23/94

DRILLING COMPANY: Beylik Drilling

DRILLING RIG TYPE: Percussion Hammer

TOTAL DEPTH DRILLED: 72 feet

CONSTRUCTION DETAILS

BOREHOLE DIAMETER: 10 inches

TOTAL NO. OFSAMPLING PORTS: 4

SAND PACK: RMC Lonestar #3

SEAL MATERIAL: Enviroplug No. 16

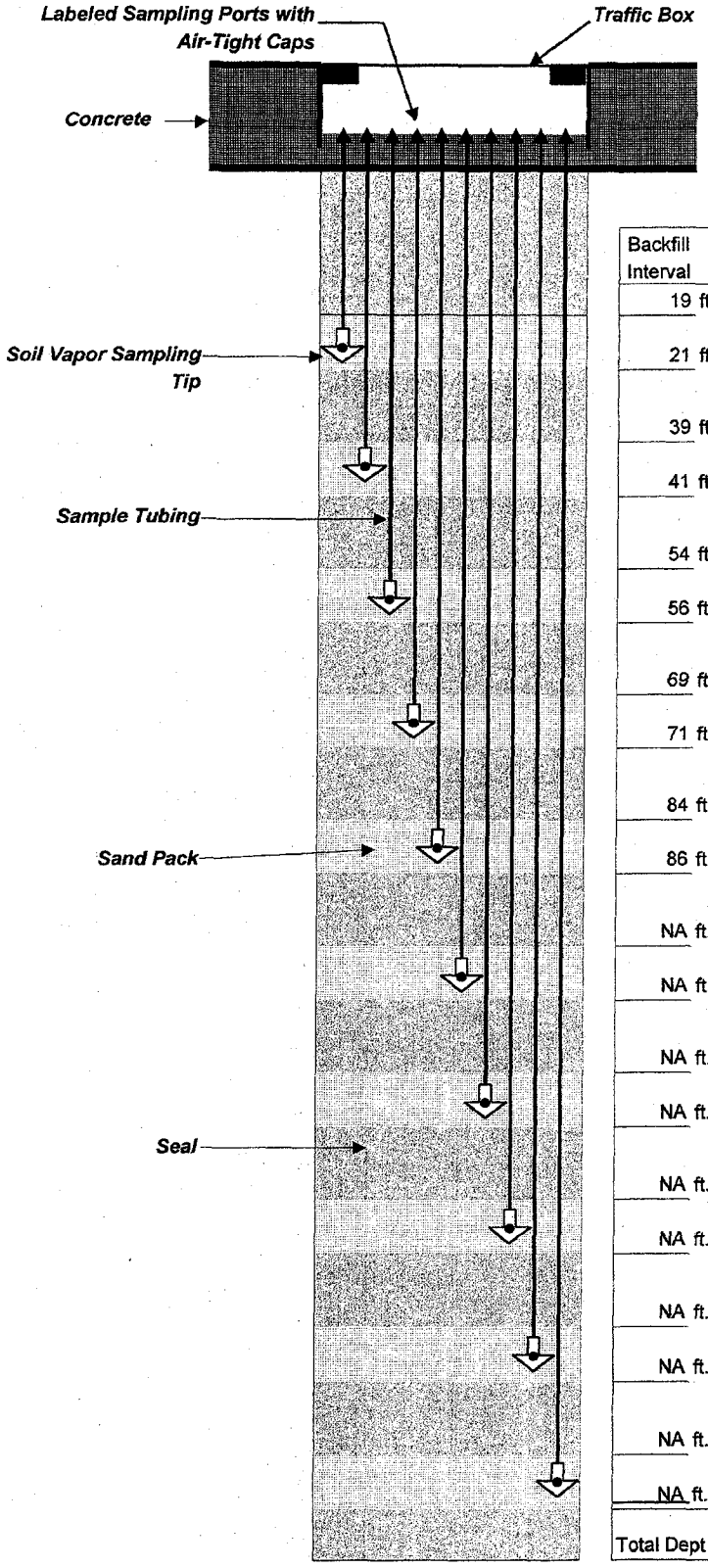
COMMENTS:

SOIL VAPOR WELL CONSTRUCTION LOG

SOIL VAPOR WELL NUMBER: 21

WELL TYPE: Soil Vapor Monitoring Well

SURFACE ELEVATION (feet above MSL): 1127.1



Backfill Interval	Sampling Depth
19 ft.	
21 ft.	20 ft.
39 ft.	
41 ft.	40 ft.
54 ft.	
56 ft.	55 ft.
69 ft.	
71 ft.	70 ft.
84 ft.	
86 ft.	85 ft.
NA ft.	
NA ft.	NA ft.
NA ft.	
NA ft.	NA ft.
NA ft.	
NA ft.	NA ft.
NA ft.	
NA ft.	NA ft.
NA ft.	
NA ft.	NA ft.
Total Dept	90 ft.

DRILLING SUMMARY

DATE COMPLETED: 10/9/94

DRILLING COMPANY: Beylik Drilling

DRILLING RIG TYPE: Percussion Hammer

TOTAL DEPTH DRILLED: 90 feet

CONSTRUCTION DETAILS

BOREHOLE DIAMETER: 10 inches

TOTAL NO. OFSAMPLING PORTS: 5

SAND PACK: RMC Lonestar #3

SEAL MATERIAL: Enviroplug No. 16

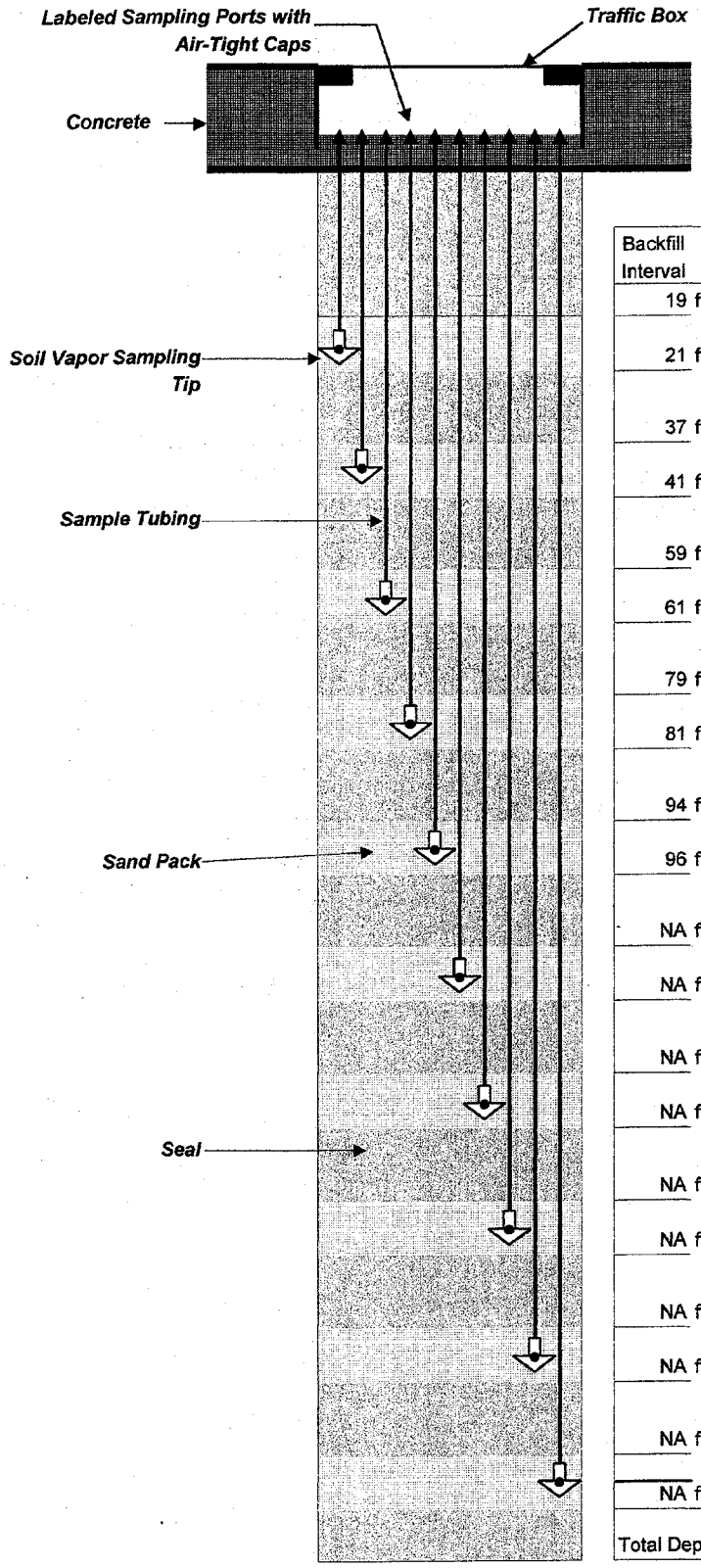
COMMENTS:

SOIL VAPOR WELL CONSTRUCTION LOG

SOIL VAPOR WELL NUMBER: 22

WELL TYPE: Soil Vapor Monitoring Well

SURFACE ELEVATION (feet above MSL): 1129.0



Backfill Interval	Sampling Depth
19 ft.	
21 ft.	20 ft.
37 ft.	
41 ft.	39 ft.
59 ft.	
61 ft.	60 ft.
79 ft.	
81 ft.	80 ft.
94 ft.	
96 ft.	95 ft.
NA ft.	
NA ft.	NA ft.
NA ft.	
NA ft.	NA ft.
NA ft.	
NA ft.	NA ft.
NA ft.	
NA ft.	NA ft.
NA ft.	
NA ft.	NA ft.
Total Dept	100.5 ft.

DRILLING SUMMARY

DATE COMPLETED: 10/12/94

DRILLING COMPANY: Beylik Drilling

DRILLING RIG TYPE: Percussion Hammer

TOTAL DEPTH DRILLED: 100.5 feet

CONSTRUCTION DETAILS

BOREHOLE DIAMETER: 10 inches

TOTAL NO. OFSAMPLING PORTS: 5

SAND PACK: RMC Lonestar #3

SEAL MATERIAL: Enviroplug No. 16

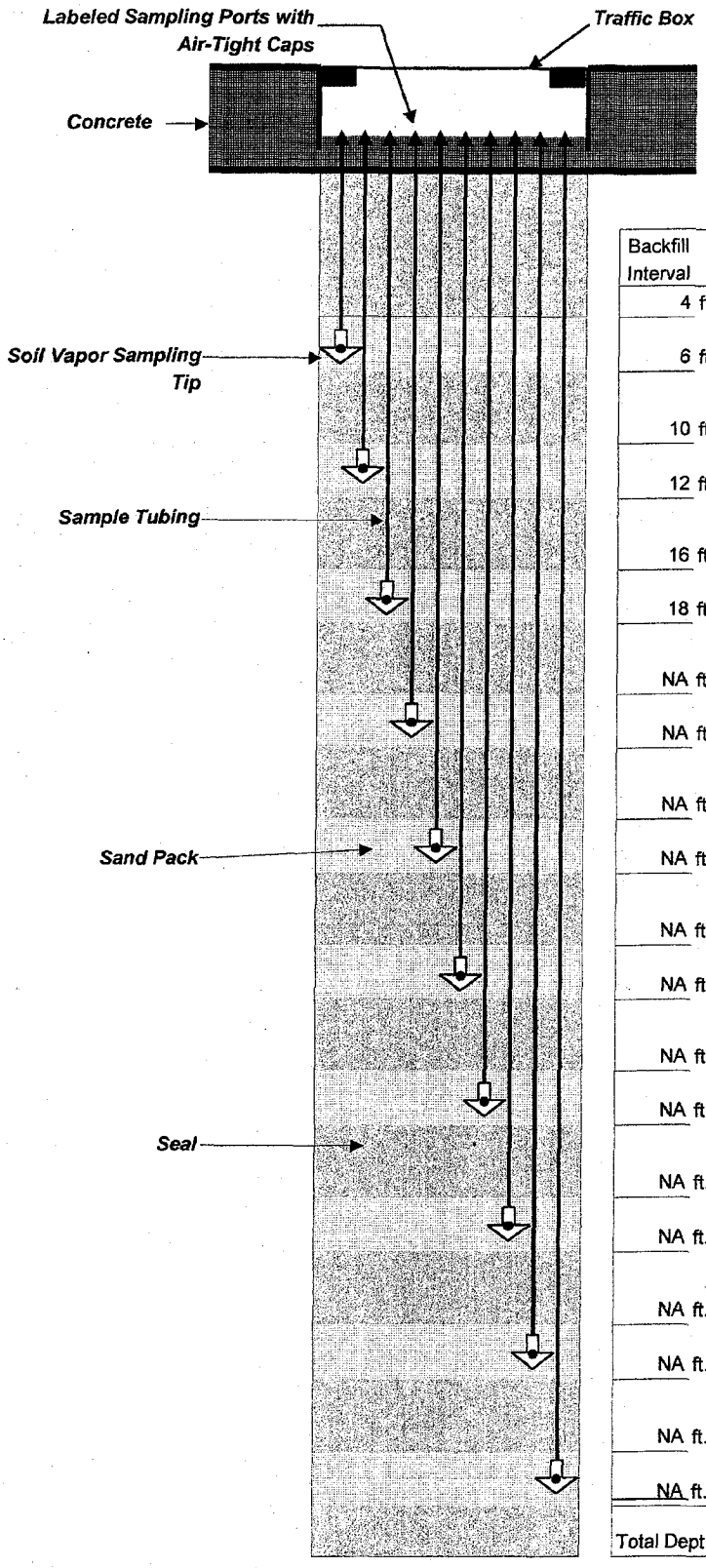
COMMENTS:

SOIL VAPOR WELL CONSTRUCTION LOG

SOIL VAPOR WELL NUMBER: 23B

WELL TYPE: Soil Vapor Monitoring Well

SURFACE ELEVATION (feet above MSL): 1094.9



Backfill Interval	Sampling Depth
4 ft.	
6 ft.	5 ft.
10 ft.	
12 ft.	11 ft.
16 ft.	
18 ft.	17 ft.
NA ft.	
NA ft.	NA ft.
NA ft.	
NA ft.	NA ft.
NA ft.	
NA ft.	NA ft.
NA ft.	
NA ft.	NA ft.
NA ft.	
NA ft.	NA ft.
NA ft.	
NA ft.	NA ft.
NA ft.	
NA ft.	NA ft.
Total Dept	21 ft.

DRILLING SUMMARY

DATE COMPLETED: 10/18/94

DRILLING COMPANY: Beylik Drilling

DRILLING RIG TYPE: Percussion Hammer

TOTAL DEPTH DRILLED: 21 feet

CONSTRUCTION DETAILS

BOREHOLE DIAMETER: 10 inches

TOTAL NO. OFSAMPLING PORTS: 3

SAND PACK: RMC Lonestar #3

SEAL MATERIAL: Enviroplug No 16

COMMENTS: